

CALFED
BAY-DELTA
PROGRAM

Phase II Report

Final Programmatic EIS/EIR Technical Appendix
July 2000

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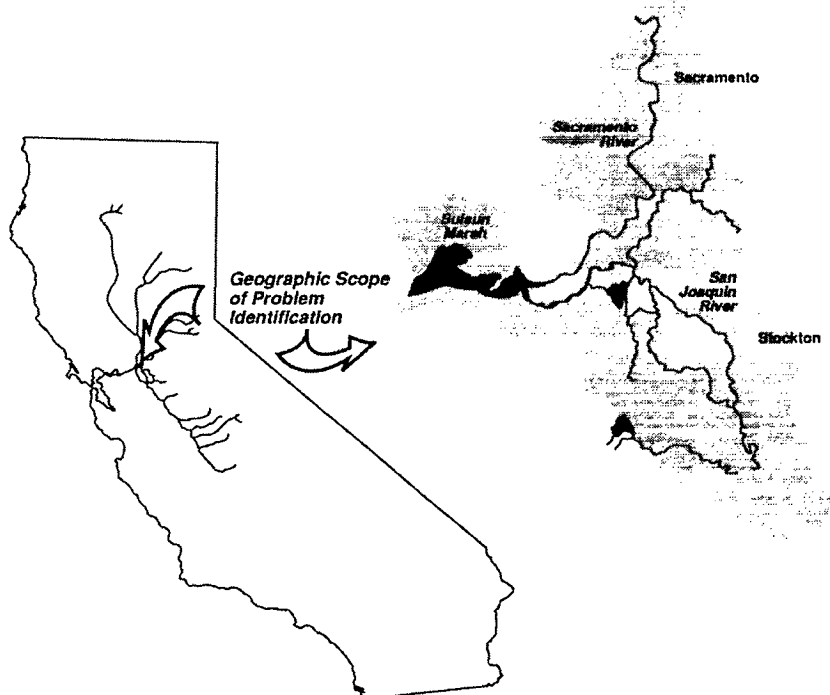
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1. INTRODUCTION

A maze of tributaries, sloughs, and islands, the San Francisco Bay/Sacramento-San Joaquin Delta estuary (Bay-Delta) is the largest estuary on the West Coast. It is a haven for plants and wildlife, supporting over 750 plant and animal species. The Bay-Delta includes over 738,000 acres in five counties. The Bay-Delta is critical to California's economy, supplying drinking water for two-thirds of Californians and irrigation water for over 7 million acres of the most highly productive agricultural land in the world.

The Bay-Delta is also the hub of California's two largest water distribution systems - the Central Valley Project (CVP) operated by the U.S. Bureau of Reclamation and the State of California's State Water Project (SWP). The CVP and SWP were built to provide improvements in navigation and flood control, water supplies for irrigation, municipal, and industrial uses, and hydropower generation. Other purposes of the CVP include fish and wildlife protection, conservation, and enhancement. In addition, at least 7,000 other permitted water diverters, some large and some small, have developed water supplies from the watershed feeding the Bay-Delta estuary. Together, these water development projects divert about 20 to 70 percent of the natural flow in the system depending on the amount of runoff available in a given year.



Geographic Scope for Problems and Solutions

The geographic scope for the problems consists of the legally defined Delta, Suisun Bay (extending to the Carquinez Strait) and Suisun Marsh.

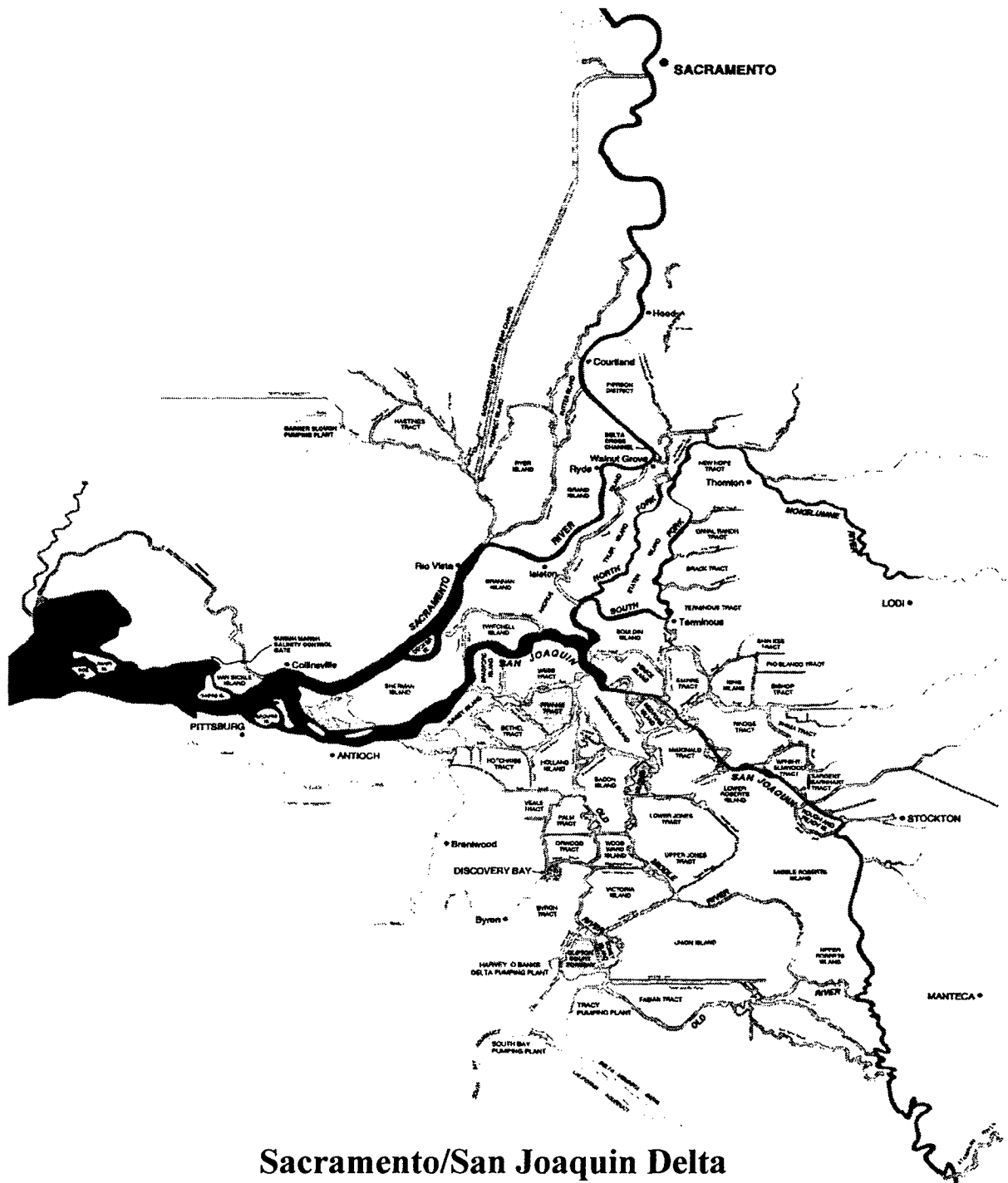
The geographic scope for developing possible solutions includes a much broader area that extends both upstream and downstream of the Bay-Delta. This solution scope includes the Central Valley watershed, the Southern California water system service area, San Pablo Bay, San Francisco Bay, near-shore portions of the Pacific Ocean out to the Farallon Islands and north to the Oregon border, and the Trinity River watershed, from which flows are diverted into the Bay-Delta system.

These diversions, along with the effects of increased population pressures throughout California, exotic species, water pollution, and numerous other factors have had a serious impact on the fish and wildlife resources in the Bay-Delta estuary. This impact, as well as other effects of the continued resource conflicts in the Bay-Delta system, is discussed in detail in Chapter 2.

Although all agree on the importance of the Bay-Delta estuary for both fish and wildlife habitat and as a reliable source of water, few agree on how to manage and protect this valuable resource. In the past two decades, these disagreements have increasingly taken the form of protracted litigation and legislative battles; as a result, progress on virtually all water-related issues has become mired, approaching gridlock.

The CALFED Bay-Delta Program was established to reduce conflicts in the system by solving problems in ecosystem quality, water quality, water supply reliability, and levee and channel integrity. The Program seeks to do this by developing a long-term comprehensive plan that will restore ecological health and improve water supply and water supply reliability for beneficial uses of the Bay-Delta system. The Program has crafted alternatives that improve water quality so as to protect Delta drinking water supplies and improve the quality of aquatic habitat. Maintaining and improving the integrity of Delta levees and channels will protect agricultural, urban, and environmental uses within the Delta and protect the quality of water used elsewhere in the state. Water conservation and recycling programs can assure the efficient use of existing water supplies and any new supplies developed through the Program. **The CALFED mission, objectives, and solution principles shown in the box on page 6 guide how the Program will be implemented.** Carrying out the mission, achieving the objectives, and adhering to the solution principles will ensure that CALFED fulfills its commitment to continuous improvement in all of the four problem areas.

No decision involving water will be popular with everyone, but the one decision that must be made by everyone is to move forward together, and the time to act is now. Over the last four years, hundreds of individuals have spent thousands of hours discussing and debating options for a long-term restoration and management plan for the Bay-Delta estuary. Through the Bay-Delta Advisory Council (BDAC), State and Federal agencies have worked with stakeholders and the public to shape these options into a comprehensive plan. This document describes the framework for such a plan, combining a specific set of actions with a vision for how those actions fit together to create a balanced solution.



Sacramento/San Joaquin Delta

The Program

The CALFED Bay-Delta Program began in May 1995 to address the tangle of complex issues that surrounds the Delta. The CALFED Program is a cooperative, interagency effort of 18 State and Federal agencies with management or regulatory responsibilities for the Bay-Delta. In addition, other agencies, such as the California Department of Food & Agriculture, regularly participate in development of CALFED policies which affect their agencies.

The CALFED agencies appointed an executive director to oversee the process of developing a long-term comprehensive plan for the Bay-Delta. The Executive Director selected staff from the CALFED agencies to carry out the task. In addition, the CALFED agencies and stakeholders worked with the interagency CALFED Program team through multi-level technical and policy teams.

The CALFED Program is a collaborative effort including representatives of agricultural, urban, environmental, fishery, business, and rural counties who have contributed

CALFED

State Agencies

Resources Agency of California*

- Department of Water Resources
- Department of Fish and Game
- Reclamation Board

California Environmental Protection Agency

- State Water Resources Control Board

California Department of Food and Agriculture

Delta Protection Commission

Federal Agencies

U.S. Department of Interior

- Bureau of Reclamation*
- Fish and Wildlife Service*
- Bureau of Land Management
- U. S. Geological Survey

U.S Army Corps of Engineers*

U.S. Environmental Protection Agency*

U.S. Department of Commerce

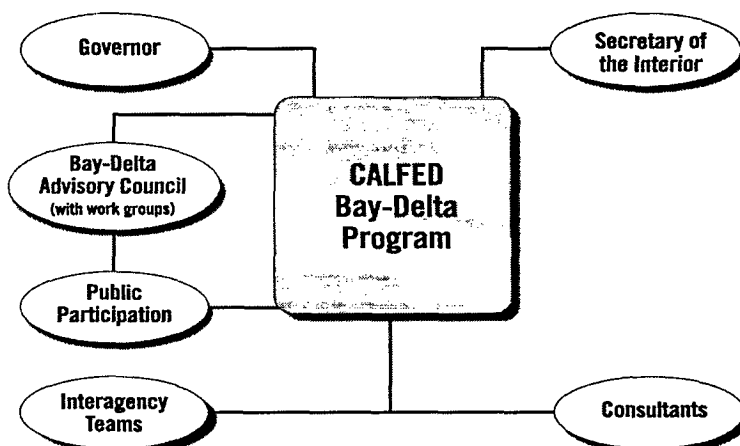
- National Marine Fisheries Service*

U.S. Department of Agriculture

- Natural Resources Conservation Service*
- U.S. Forest Service

Western Area Power Administration

* Co-lead agencies for EIS/EIR



to the process. BDAC, a federally chartered citizens' advisory committee with over 30 members, provides formal comment and advice to the agencies during regularly scheduled public meetings. In addition, the CALFED process has included members of the public in development of every program component from ecosystem restoration to financing. The Program was divided into three discrete phases.

CALFED BAY-DELTA PROGRAM MISSION STATEMENT, OBJECTIVES AND SOLUTION PRINCIPLES

The mission of the CALFED Bay-Delta Program is to develop a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system.

CALFED developed the following objectives for a solution:

- Provide good water quality for all beneficial uses.
- Improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species.
- Reduce the mismatch between Bay-Delta water supplies and current and projected beneficial uses dependent on the Bay-Delta system.
- Reduce the risk to land use and associated economic activities, water supply, infrastructure and the ecosystem from catastrophic breaching of Delta levees.

In addition, any CALFED solution must satisfy the following **solution principles**:

- ***Reduce Conflicts in the System*** Solutions will reduce major conflicts among beneficial uses of water.
- ***Be Equitable*** Solutions will focus on solving problems in all problem areas. Improvements for some problems will not be made without corresponding improvements for other problems.
- ***Be Affordable*** Solutions will be implementable and maintainable within the foreseeable resources of the Program and stakeholders.
- ***Be Durable*** Solutions will have political and economic staying power and will sustain the resources they were designed to protect and enhance.
- ***Be Implementable*** Solutions will have broad public acceptance and legal feasibility, and will be timely and relatively simple to implement compared with other alternatives.
- ***Have No Significant Redirected Impacts*** Solutions will not solve problems in the Bay-Delta system by redirecting significant negative impacts, when viewed in their entirety, within the Bay-Delta or to other regions of California.

Phase I

In Phase I, completed in August 1996, CALFED identified the problems confronting the Bay-Delta, developed a mission statement and guiding principles, and devised three preliminary categories of solutions for Delta water conveyance.

Following scoping, public comment, and agency review, CALFED concluded that each program alternative would include a significant set of program actions which were grouped into elements to address problems for levee system integrity, water quality improvements, ecosystem restoration, and water use efficiency measures. Two additional elements (water transfers and watershed management) were added to each alternative because of their value in helping the Program meet its multiple objectives. These six program elements have generally been referred to as the *common programs*. In addition, CALFED identified three preliminary alternatives to be further analyzed in Phase II. The three preliminary alternatives represented three differing approaches to conveying water through the Delta. The first conveyance configuration relied primarily on the existing conveyance system, with some minor changes in the south Delta. The second configuration relied on enlarging channels within the Delta. The third configuration included in-Delta channel modifications and a conveyance channel that would move some water around the Delta. Each of these alternatives also included consideration of new ground and surface water storage options.

Phase II

CALFED is currently completing Phase II, which will culminate in a Final Programmatic Environmental Impact Statement/Environmental Impact Report (EIS/EIR) in July 2000 and a Federal Record of Decision (ROD) and State Certification (CERT) in August 2000. A programmatic EIS/EIR, also referred to as a first-tier document, is typically prepared for a series of actions that can be characterized as one large project and is required for actions proposed by or approved by state and federal agencies. In Phase II, CALFED developed a Preferred Program Alternative, conducted comprehensive programmatic environmental review, and developed the implementation plan focusing on the first seven years (Stage 1) following the Certification and ROD on the EIS/EIR.

This Phase II Report primarily focuses on the Preferred Program Alternative including background, description, and implementation plan. The full Final Programmatic EIS/EIR, appendices, and supporting technical reports -- comprising thousands of pages -- are available from CALFED and at major libraries throughout the state.

Phase III

In Phase III, following completion of the Final Programmatic EIS/EIR, implementation will begin. This period will include site-specific environmental review and permitting, as necessary. Because of the size and complexity of any of the alternatives, implementation is likely to take place over a period of 30 or more years. Part of the challenge for Phase II is designing an implementation strategy that acknowledges this long implementation period and keeps all participants committed to the successful completion of all phases of implementation.

CALFED has begun more detailed planning for the first part of the implementation phase, called Stage 1. This stage will last for the first seven years of Phase III. Even more detailed planning has occurred for the first two years of Stage 1. Specific actions, called Stage 1a actions, are being developed for the first two years of implementation. More detail on implementation is included in Chapter 4.

Public Involvement

During Phase I, which ended August 1996, CALFED held scoping meetings, technical workshops, public information meetings, and public BDAC workgroup meetings. The commitment to active public involvement continued through Phase II with additional public meetings, presentations before focused groups, media outreach, special mailings of newsletters, regularly updated information on the Program's web site, and a toll-free public information telephone line.

In addition to the many CALFED-sponsored general public meetings and stakeholder workshops, 17 formal public hearings on the March 1998 Draft Programmatic EIS/EIR were held around the state in April and May 1998. During the formal public comment period the Program received over 1800 comments which included 469 speakers at the hearings. Thousands of post cards and form letters were also received. The comments were used to improve the program plans and assist in evaluation and development of the Preferred Program Alternative. The subsequent Draft EIS/EIR with appendices included changes that reflected comments received.

WHERE TO FIND PUBLIC OUTREACH INFORMATION

- Program's website (<http://calfed.ca.gov>)
- Toll-free public information telephone line (1-800-700-5752)
- *CALFED News, EcoUpdate* and Factsheets (available from CALFED Bay-Delta Program, 1416 Ninth Street, Suite 1155, Sacramento, CA 95814; phone 916-657-2666)
- Bay Delta Advisory Council and other public meetings

In 1999, following the release of the December Revised Phase II Report, CALFED held several informational workshops for the public. These covered the framework for the draft preferred alternative and specific aspects of the proposed program such as water conservation and conjunctive use.

The release of the June 1999 Draft Programmatic EIS/EIR was followed by a 90-day public comment period. Sixteen formal public hearings were held in August and September 1999 at which approximately 800 people testified. Almost 1,500 letters and 2,400 postcards also were received commenting on the document. Copies of the comments and the responses to those comments can be found in the Responses To Comments documents.

The Program has worked to involve California's diverse multi-cultural communities by producing fact sheets in five languages (Spanish, Chinese, Japanese, Korean, and Vietnamese), meeting with multi-cultural business, media, social service and agricultural organizations, and placing media notices in ethnic media outlets. Increasing awareness and knowledge among the multi-cultural communities is a continued goal of CALFED's public outreach.

Tribal Involvement

CALFED agencies remain committed to full consideration of Native American concerns in the CALFED process. As the CALFED Program evolved and the concept of a solution area developed, additional efforts were made to communicate and coordinate with tribal governments. Although there are no federally recognized tribes in the Delta, CALFED will actively engage the tribes in the Bay-Delta watershed as specific projects in these areas develop. Formal consultation with tribes will be conducted on a government-to-government basis, as required by President Clinton's April 29, 1994 Executive Order, as future projects are identified that may potentially affect Indian trust assets. If projects or activities are proposed for an area that contains a reservation or rancheria or any Indian trust asset, consultation will take place early in the planning process.

In the interim, CALFED will continue to build on its efforts to increase communication with tribal governments as the Program moves towards implementation. In July 1999, the Department of the Interior appointed a tribal representative to the BDAC. Tribal representatives also regularly attended various meetings of CALFED agency policy makers, BDAC, and work group meetings. In addition, the CALFED agencies have held several discussions with tribes through a variety of meetings sponsored by the U. S. Environmental Protection Agency and Bureau of Indian Affairs. In November 1999, the CALFED agencies approved \$100,000 for tribal participation in the CALFED process. Those funds will be used by tribal governments to gain information on specific tribal resources that may be affected by potential CALFED actions, facilitate increased tribal attendance and participation in CALFED meetings and workgroups, and increase education and coordination between CALFED agencies and participating tribes.

Some Delta Statistics

Area of the Watershed: The system drains more than 61,000 square miles, or 37% of the state.

Area of the Delta: The legal Delta includes 738,000 acres.

Delta Inflow*: Historic inflow ranges from 6 to 69 million acre feet (MAF) per year; average is 24 MAF.

Diversions: Over 7,000 diverters draw water from the system, including 1,800 in the Delta itself.

Delta Exports*: The SWP and CVP draw an average of 5.9 MAF (approximately 3.6 MAF for agriculture and 2.3 MAF for urban uses) from the Delta each year .

In-Delta Water Use: Net in-Delta water use averages approximately 1 MAF annually.

Flora: Over 400 plant species can be found in the Delta, not including agricultural crops.

Fauna: The Delta harbors about 225 birds, 52 mammals, and 22 reptile and amphibian species.

Fish: There are 54 fish species in the Delta, and a total of 130 in the Delta and Bay.

Marshes: There are 8,000 acres of tidal marsh in the Delta.

Levees and Channels: Over 700 miles of waterways are protected by 1100 miles of levees.

Subsidence: Some Delta lands are more than 20 feet below sea level.

Delta Farmland: Over 520,000 acres are farmed in the Delta.

Principal Crops: The most commonly grown Delta crops are wheat, alfalfa, corn, and tomatoes.

Agricultural Value: Average annual gross value of Delta production is \$500 million.

Recreation: Recreational use of the Delta is about 12 million user days per year

* Simulated flow based on historical hydrology, but with existing storage and conveyance facilities in place and operating to meet 1995 levels of demand.

2. BACKGROUND

2.1 Bay-Delta Problems/Objectives

There is a rich history of conflict over resource management in the Bay-Delta system. For decades the region has been the focus of competing interests--economic and ecological, urban and agricultural. These conflicting demands have resulted in several resource threats to the Bay-Delta: the decline of wildlife habitat; the threat of extinction of several native plant and animal species; the collapse of one of the richest commercial fisheries in the nation; the degradation of Delta water quality; the continued land subsidence on Delta islands; and a Delta levee system faced with a high risk of failure.

At the simplest level, problems occur when there is conflict over the use of resources from the Bay-Delta system. As water demands increase, California asks more of the system, and there is more conflict. Single-purpose efforts to solve problems often fail to address the conflict. To the extent that these efforts acquire or protect resources for one interest, they may cause impacts on other resources and increase the level of conflict. Major conflicts are summarized below.

- *Fisheries and Water Diversions.* The conflict between fisheries and water diversions results primarily from fish mortality attributable to water diversions. This includes direct loss at pumps, reduced survival when young fish are drawn out of river channels into the Delta, reduced spawning success of adults when migratory cues are altered, and reduced survival associated with inadequate stream flows and reduced Delta outflows. The need to protect listed species has prompted restrictions on pumping and other regulations, which restrict the quantity and timing of diversions.
- *Habitat and Land Use.* Habitat to support various life stages of aquatic and terrestrial plants and animals in the Bay-Delta has been lost because of conversion of that habitat to agricultural and urban uses. In addition, some habitat has been lost or adversely altered due to construction of flood control facilities and levees needed to protect developed land. Efforts to restore the habitat can also create conflict with existing uses, such as agriculture and levee maintenance.
- *Water Supply Availability and Other Beneficial Uses.* As water use and competition for water have increased during the past several decades, so has conflict among users. A major part of this conflict is between the volume of instream water needs and out-of-stream water needs, and the timing of those needs within the hydrologic cycle.

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- **Water Quality and Human Activities.** Water quality for ecosystem and consumptive uses can be adversely affected by a broad range of human activities. In addition to particular activities that discharge pollutants (such as abandoned mines or industrial sources), urban and agricultural areas produce degraded surface runoff that can seriously affect the Bay-Delta's many beneficial uses.

From these central conflicts, CALFED identified a series of problems in each of four problem areas. From each problem, a program objective was developed. A complete set of identified problems and program objectives is contained in a publication entitled *Problem/Objective Definition*, March 1996. Copies are available from the CALFED Program office. The four problem areas for the Bay-Delta system are:

Ecosystem Quality - The Bay-Delta system no longer provides the broad diversity of habitats nor the habitat quality necessary to maintain ecological functions and support healthy populations and communities of plants and animals. The health of the Bay-Delta ecosystem has declined in response to a loss of habitat to support various life stages of aquatic and terrestrial biota and a reduction in habitat quality due to several factors including diversion of water, toxics, and exotic species.

The primary ecosystem quality objective of the Program is to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species. A goal that follows from this primary objective is to achieve recovery of at-risk native species dependent on the Delta and Suisun Bay as the first step toward establishing large, self-sustaining populations of these species; support similar recovery of at-risk native species in San Francisco Bay and the watershed above the estuary; and minimize the need for future endangered species listings by reversing downward population trends of native species that are not listed. The strategy to achieve the objective and goals for ecosystem restoration is to begin recovery of ecosystem health by reducing or eliminating factors that degrade habitat, impair ecological functions, or reduce the population size or health of species.

Water Supply Reliability - During the past several decades, as water diversions and recognition of environmental water needs have both increased, conflicts between these water uses have also increased. In response to declining fish and wildlife populations, water flow and timing requirements have been established for certain fish and wildlife species. Over the past decade, a number of protective actions including the Central Valley Project Improvement Act and the Delta Accord have reduced the CVP and SWP ability to meet the water demand both in quantity and timing for exports from the Delta. Conflicts between protective environmental measures and Delta exports also reduce opportunities for market water transfers. There are concerns that additional restrictions that might be needed to protect species or for other regulatory purposes could increase the

uncertainty of Delta water supplies which, in turn, have created economic uncertainty in the water service areas and increased conflict over supplies.

The primary water supply reliability objective of the Program is to reduce the mismatch between Bay-Delta water supplies and current and other projected beneficial uses dependent on the Bay-Delta system. The Program has a three-part strategy to improve water supply reliability:

- Increase the utility of available water supplies (making water suitable for more uses and reuses).
- Improve access to existing or new water supplies, in an economically efficient manner, for environmental, urban, and agricultural beneficial uses.
- Improve flexibility of managing water supply and demand in order to reduce conflicts between beneficial uses, improve access to water supplies, and decrease system vulnerability.

This strategy seeks to reduce the mismatch between supply and beneficial uses through a variety of actions including increasing the ability and flexibility to store and transport water, reducing the impact of water diversions on the Bay-Delta system, and managing demand by increasing water conservation and recycling and by better facilitating water transfer markets.

Water Quality - Bay-Delta water quality is a major concern. The Delta is a source of drinking water for millions of Californians and is critical to the state's agricultural sector. In addition, good water quality is required to maintain the high quality habitat needed in the Bay-Delta system to support a diversity of fish and wildlife populations.

The primary water quality objective of the Program is to provide good water quality for all beneficial uses. Good water quality means different things to different users, and there are different ways to achieve the objective. The Program's strategy to achieve the water quality objective includes a combination of measures including source reduction, alternative sources of water, treatment, and storage and conveyance improvements. Many of the Program's water quality sub-objectives concentrate on a direct source control approach.

Levee System Integrity - Settlers first constructed levees in the Sacramento-San Joaquin Delta during the late 1800s. Initially settlers built levees to turn swamp and overflow lands into agricultural land and over time increased the levee heights to maintain protection as both settling of levees and shallow subsidence of Delta island soils occurred (oxidation, peat fires, and wind erosion have lowered interior island elevations over time). The increased levee heights combined with poor levee construction, and

inadequate levee maintenance makes Delta levees vulnerable to failure, especially during earthquakes or floods. Delta island farmland, residences, wildlife habitat, and critical infrastructure can be flooded as a result of a levee failure. Levee failure on specific Delta islands can have direct or indirect impacts on water supply distribution systems. Direct impacts result from flooding of distribution systems such as the Mokelumne Aqueduct, and indirect impacts result from salty water moving up into the Delta, as an island is inundated under non-flood conditions. The increased salinity in the Delta would be of particular concern in a low water year, when less freshwater would be available to flush out the salt water (such as occurred when the Brannan Andrus Island levee failed in 1972). Long-term flooding of specific Delta islands can have an effect on water quality by changing the rate and area of the mixing zone. A long interruption of water supply for in-Delta and export use by both urban and agricultural users could result, until the salt water could be flushed from the Delta.

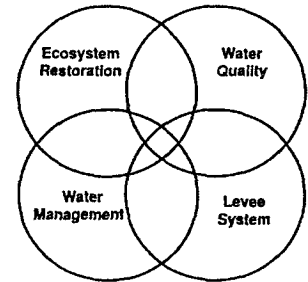
The primary levee system vulnerability objective of the Program is to reduce the risk to land use and associated economic activities, water supply, infrastructure, and the ecosystem from catastrophic breaching of Delta levees. Failure of Delta levees can result either from catastrophic events, such as earthquakes and floods, or from gradual deterioration. Subsidence of the Delta island peat soils and settling of levee foundations places additional pressure on levees and increases the risk of failure. The Program's strategy for achieving the levee system integrity objectives is to implement a comprehensive plan to address long-term levee stabilization and develop an effective emergency response capability in the event of failure while providing opportunities to maintain and enhance ecosystem values.

The unprecedented scope of the CALFED Bay-Delta Program cannot be overstated. The vast geographic extent of the area under consideration, the variety and complexity of the hydrological and ecological process involved, the history of conflict among the affected interests, and the magnitude of the potential economic consequences for California's commercial, agricultural, and industrial base all combine to make this effort the most ambitious of its kind anywhere in the world. In the United States, only the well-known efforts at addressing environmental and institutional problems in the Columbia River Basin, Chesapeake Bay, and in the Florida Everglades can serve as comparisons.

2.2 Fundamental Program Concepts

Three fundamental concepts related to the Bay-Delta system and its problems have guided the development of proposed CALFED solutions. These concepts are not new, but CALFED has looked at them in new ways to develop options for solving problems successfully.

First, the four problem areas (ecosystem quality, water quality, water supply reliability, and levee system integrity) are **interrelated**. CALFED cannot effectively describe problems in one problem area without discussing the other problem areas. It follows that solutions will be interrelated as well; many past attempts to improve a single problem area have achieved limited success because solutions were too narrowly focused.



Second, there is great variation in the flow of water through the system and in the demand for that water at any time scale that might be examined (from year to year, between seasons, even on a daily basis within a single season). The value of water for all uses tends to vary according to its scarcity, quality, and timing. This leads to the need for a water management strategy.

Finally, the solutions must be guided by **adaptive management**. The Bay-Delta system is exceedingly complex, and it is subject to constant change as a result of factors as diverse as global warming and the introduction of exotic species. CALFED will need to adaptively manage the system as we learn from our actions and as conditions change.

Interrelationships

In the past, most efforts to improve water supply reliability or water quality, improve ecosystem health, or maintain and improve Delta levees were single-purpose projects. A single purpose can keep the scope of a project manageable but may ultimately make the project more difficult to implement. The difficulty occurs because a project with narrow scope may help to solve a single problem but have impacts on other resources, causing other problems. This in turn leads to conflict. Ultimately, either no problem is solved, or one problem is solved while others are created.

The CALFED Program takes a different approach, recognizing that many of the problems in the Bay-Delta system are interrelated. Problems in any one problem area cannot be solved effectively without addressing problems in all four areas at once. This greatly increases the scope of our efforts but will ultimately enable us to make progress and move forward to a lasting solution.

Thus, the most important single difference between the CALFED Bay-Delta Program and

Eight Program Elements Working Together to Solve the Four Problem Areas

- Long-Term Levee Protection Plan
- Water Quality Program
- Ecosystem Restoration Program
- Water Use Efficiency Program
- Water Transfer Program
- Watershed Program
- Storage
- Conveyance

past efforts to solve resource problems is the comprehensive nature of CALFED's interrelated resource management strategies. A comprehensive CALFED solution will also be supported by governance and finance mechanisms that overcome problem-specific or resource-specific limitations of previous, more narrowly focused, approaches.

Significantly, there are many linkages among the objectives in the four problem areas and among the actions that might be taken to achieve these objectives. Solving problems in four areas at once does not require a four-fold increase in the cost or number of actions. Most actions that are taken to meet program objectives, if carefully developed and implemented, will make simultaneous improvements in two, three, or even four problem areas.

What kinds of actions can be taken to solve problems in the Bay-Delta system? The actions can be grouped into categories of levee system improvements, water quality improvements, ecosystem restoration, water use efficiency, water transfers, watershed management, water storage, and Delta conveyance modifications. Specific actions range from physical restoration of habitat in the Delta to water conservation measures. Descriptions of the Program's strategies for solving problems by implementing these actions are presented in Chapter 3 of this document. More detailed descriptions for the first stage of implementation are presented in Chapter 4. Complete descriptions of program elements are contained in other *Program Plan Appendices* to this *Final Programmatic EIS/EIR*.

While CALFED generally does not expect to rely on new regulations to implement Program objectives, it does recognize that existing regulatory programs will continue to be implemented by CALFED agencies. CALFED represents a unique opportunity to provide high-level coordination of these regulatory programs so that regulatory implementation works in furtherance of CALFED Program goals. The CALFED Bay-Delta Program specifically defines incentives and voluntary partnerships to implement many individual actions in the Program. Incentives allow stakeholders to participate in CALFED actions which may not have been economical to them without the incentives. Partnerships allow stakeholders and CALFED agencies to leverage their individual resources by teaming together to implement certain actions.

Some regulations, like those contained in the State and federal Endangered Species Acts (ESA) and Section 404 of the Clean Water Act, are ones that CALFED must satisfy as the Program is implemented. Many other regulatory actions can be made more effective and constructive as a result of CALFED actions. For example, water quality regulatory agencies are obligated to develop total maximum daily loads (TMDLs) for certain water quality constituents in the Bay-Delta system. CALFED efforts in monitoring and research will provide valuable information which will assist regulatory agencies in developing these TMDLs. CALFED incentive-based source control actions will help reduce the load of these and other pollutants. In this way, the CALFED Bay-Delta Program will help in meeting many ongoing regulatory requirements.

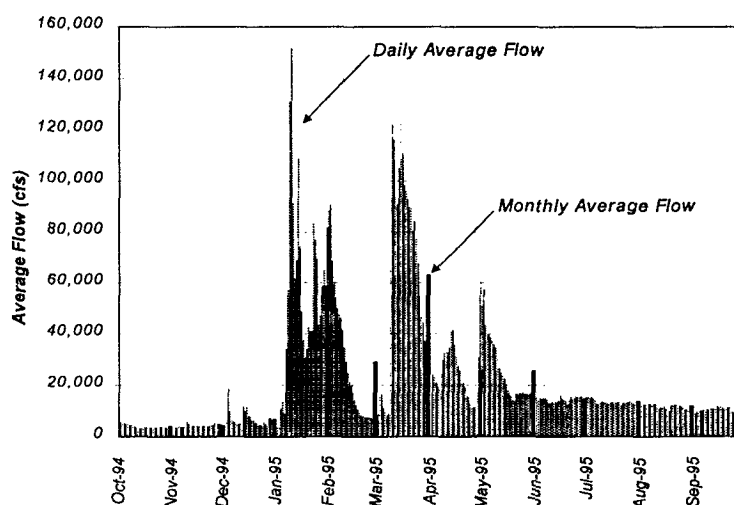
Variations in Supply and Demand

Any consideration of water management in California must start with a recognition of the immense variability in the availability of and demands for water. The watershed of the Bay-Delta system is subject to a highly variable rain and snowfall pattern. The total amount of precipitation and runoff in the watershed varies widely from month to month and from year to year. Year types are classified into five types from wet to critically dry, but even within each type there is considerable variation in the pattern of precipitation. Within any given year, whether wet or dry, most of the rain falls in the winter months, while snow pack typically melts in the late spring and early summer. In other months, water flow is typically much lower, leading to dramatically different flow levels for different months. Even within each month, flow can vary widely.

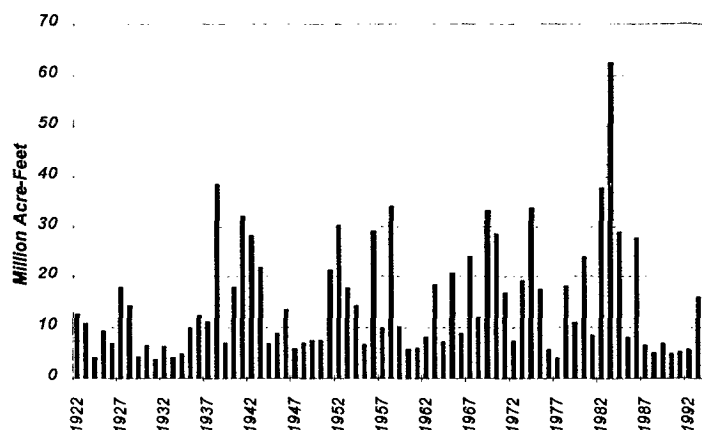
Two figures help illustrate the variability in the hydrologic system. Water flow variability is most notable when daily flows are examined. The first figure presents a graph of daily flows throughout a water year. For comparison, average monthly flows are also shown (thicker black bars). The average monthly flows mask the much greater variation exhibited in daily flows that rise and fall with the passing of each major storm system. It is quite typical for winter and spring storms to produce periodic peaks in flow such as those shown in January, March, and May.

The second figure shows a simulated yearly total Delta outflow for the period from 1922 to 1994. The simulated Delta outflow is based on historical hydrology, but with existing storage and conveyance facilities in place and operating to meet system-wide 1995 level of demand. The graph reflects

**Sacramento River Flow at Hamilton City
Water Year 1995**



Yearly Total Delta Outflow



the average annual variability that occurs from year to year. Memorable extremes, such as the drought of 1976-77, are quite apparent.

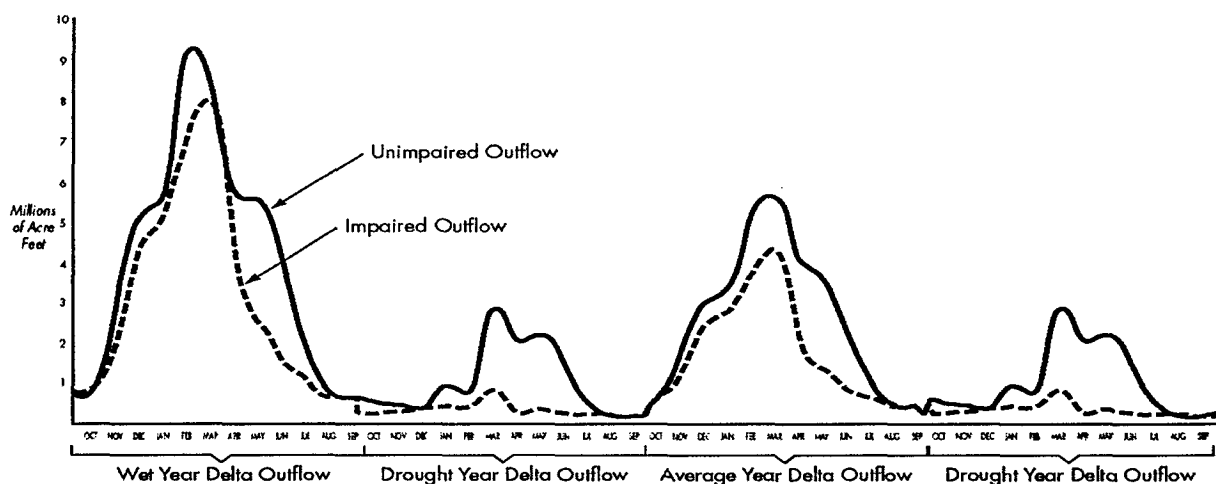
The demand for water also varies over time. Agricultural demands tend to be higher than average in dry years, because there is less precipitation available and plants need more irrigation. In addition, local surface supplies may be more limited in dry years, which imposes further demands on local groundwater and on water imported from elsewhere in the system. Agricultural water demand also varies substantially seasonally; the demand is highest in the summer, when natural flows are lowest.

Urban demands for water vary as well. Many urban areas experience substantial seasonal variation in demands for landscaping irrigation. In addition, urban areas dependent on the Bay-Delta for some or all of their drinking water supply place a significant premium on the quality of water (in addition to the quantity). In dry years and in dry seasons, increased salinity in the Bay-Delta (from both saltwater intrusion and upstream discharges), reduces the usefulness of Bay-Delta water to urban users.

The value of water in the ecosystem varies over time. For example, high flows in the early spring have substantial ecosystem benefits, including maintaining river and stream channels and triggering behavioral changes in some species, such as anadromous fish, that have evolved in this variable system. Ecosystem water needs are generally more consistent with the natural seasonal flow pattern than consumptive water demand, but historic changes in the system have resulted in circumstances where existing flows are low during times of high ecosystem need.

Variation in ecosystem demands for water is highlighted in the figure, below, which illustrates the simulated impact of the water diversion system on natural flow patterns.

Change in Delta Outflow from System Development



This figure suggests that water diversions have had a relatively higher impact on the natural flow regime in drier water years than in wetter water years. As discussed below, many of the recent environmental protections in the Bay-Delta system have tried to reduce this relative stress on the environment during drier years. This discussion of the wide variability of both the supply of and demand for water suggests one important water management conclusion; averages don't tell the whole story.

Averages are misleading because they mask the variability in flows and demands. An increase in Delta outflow in an average year may have only a minor beneficial effect on the environmental health of the system, whereas a similar increase in a dry or critically dry period may yield much greater environmental benefits. Similarly, although average increases in supplies may be desirable for urban and agricultural users, dry and critical year supplies are substantially more important given the higher demand and reduced alternatives. This variation in water supply and demand results in conflicts over water in the state, and conflict increases substantially in dry and critical years when all water uses, both environmental and consumptive, demand more water.

Institutional and Operational Framework

In response to the substantial variations in hydrology and in water demands, California has developed an extremely elaborate water diversion, storage, and delivery system. The broad purpose of this system has been to collect water in times of availability and to deliver it at the time and place of need.

In addition to the physical water system infrastructure, California has also created a legal/management structure governing its water resources. This legal/management structure relies on a complex set of rights, regulations, and contractual relationships that define which water users (both consumptive and environmental) will have access to water at particular times. For consumptive users, this system relies heavily on the doctrine of prior appropriation -- those water users with more senior rights generally have more reliable water supplies than those with more junior rights.

In addition to allocating shortages, the legal/management system also has the effect of allocating water savings. For example, if an upstream diverter introduces some water saving management techniques, the next downstream diverter with senior rights may have an opportunity to access additional water, depending on water conditions. (More information on this point can be found in Section 2 of the *Water Transfer Program Plan* Appendix). Sometimes the allocation of savings is more complicated. In the State Water Project, water savings by one project user (Southern California urban users, for example) go back to the Project and are allocated by contractual rights to the next contractual project user (Kern County, for example). Finally, the California constitution, the Public Trust Doctrine, and common law principles govern how water can be used.

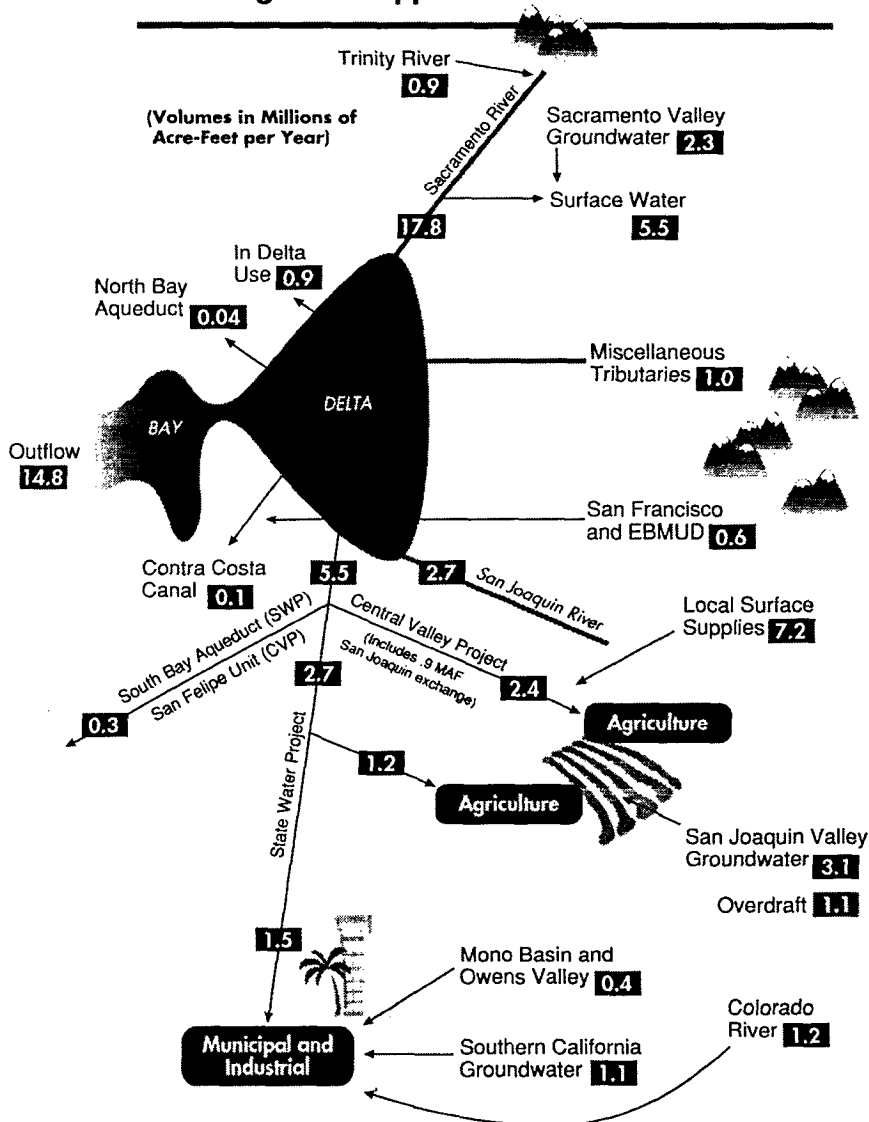
The following two figures illustrate a simplified view of water use in (1) an average year, and (2) in a dry year.

Two aspects of these figures are worth highlighting. First, Delta water use **throughout** the system is substantially lower during the simulated dry year period. This is true for urban and agricultural users which experience water shortages and shift to other sources to meet their demand. It is also true for the environmental uses (as represented by the decreased Delta outflow) because there is simply less water in the system.

Second, the figures show clearly an ongoing problem with groundwater overdraft in the San Joaquin Valley. This is especially true in the dry year scenario, where groundwater pumping has been used to make up for significant shortfalls of imported water. The problem of groundwater overdraft is critical to long term water management in California. Overdraft can cause land subsidence, deterioration of water quality, and increases in groundwater pumping. In addition, concerns about groundwater depletion and degradation are frequently voiced in the debate over water transfers in the State. While many western states have begun to take a coordinated water management approach that includes active management of groundwater resources, California has not. Long-term effective groundwater management throughout California will be essential to the success of a range of CALFED programs. The current lack of comprehensive groundwater management will limit CALFED's ability to improve water management in California, and will hamper efforts to carry out programs such as groundwater banking, conjunctive use, and water

Water Management in California

Long Term Supplies 1995-level Demand



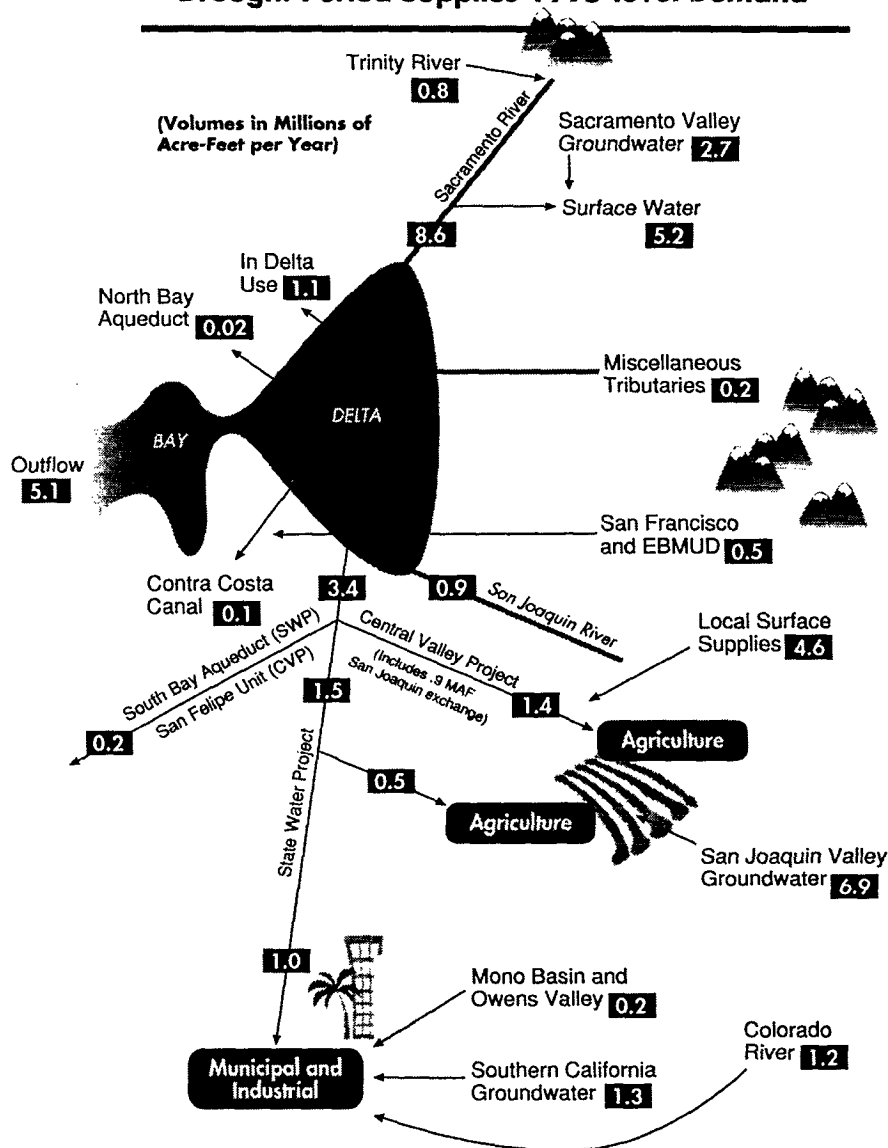
transfers. Groundwater management in California is an institutional challenge that has not yet been fully addressed.

The preceding discussion of the hydrological and institutional framework of California water management is useful in understanding the current conflicts over water resources in the State. In recent years, the water management system has experienced increasing stress as the regulatory process has started addressing the environmental degradation evident in the Bay-Delta system. In effect, these regulatory measures have increased Delta outflow and reduced diversions, forcing consumptive water users to place more reliance on other sources (groundwater pumping, water transfers, etc.) Given that the last several years have generally been wet water years, the impacts of these environmental measures have generally been muted. These recent changes (Endangered Species Act protections, the Central Valley Project Improvement Act, etc.) in the regulatory regime will reduce water deliveries by the State and federal water projects in the driest of water years and generally indicate reduced operational flexibility.

Conflicts over water in the state intensify in the driest water years, when all uses, both environmental and consumptive, are competing for a drastically reduced natural water supply. In addition, the regulatory regime itself has had another effect. Protecting environmental uses

Water Management in California

Drought Period Supplies 1995-level Demand



through regulatory constraints has restricted the use of the water delivery system at certain times and has reduced the capability of the system to respond to consumptive user needs.

Adaptive Management

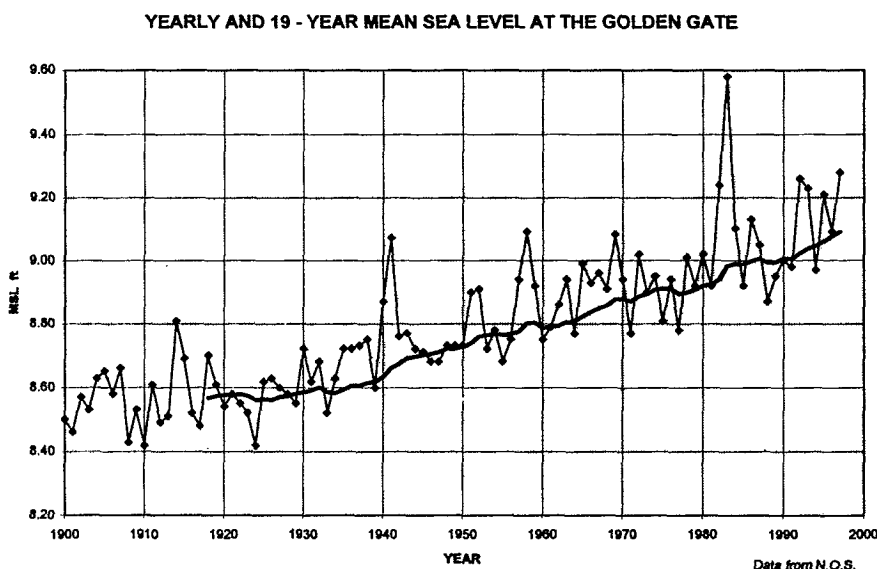
A third fundamental concept of the Program is adaptive management.

No long-term plan for management of a system as complex as the Bay-Delta can predict exactly how the system will respond to Program efforts or foresee events such as earthquakes, climate change, or the introduction of new species to the system.

The possibility of sea level changes induced by global warming or by other long-term climate trends is a good example of the need for an adaptive management approach to CALFED issues. Rising sea levels could have significant adverse impacts on the Delta system (including habitat, water supply, and Delta agriculture). Higher sea levels would increase salinity levels throughout the Delta, impeding

habitat restoration projects in the Delta and dramatically reducing the value of water exported from the Delta for urban or agricultural uses. Similarly, long-term changes in temperatures could result in more variability in precipitation and runoff from year to year and season to season. Higher flooding could become more common, and drought periods could become more frequent. Some estimates indicate that California will experience an increase in winter runoff and a decrease in spring and summer runoff, with a resultant decrease in water supply reliability in the Central Valley basin. Given the high level of uncertainty over the direction and magnitude of climate change effects on Bay-Delta hydrological resources, adaptive management is essential.

The fundamental concept of adaptive management is that management prescriptions will be assessed and refined (adapted) according to new information in order to meet program goals and objectives. Adaptive management is an iterative process that involves: (1) identifying clear goals and objectives for the program elements; (2) using models to display our understanding of the



Bay-Delta system and to assess and prioritize a range of potential actions to improve the system; (3) implementing actions and research most likely to achieve goals and objectives and to improve our knowledge of the system; (4) monitoring and assessment of actions to gain information to refine the models and alter future actions in order to meet program goals and objectives; and (5) changing management activities based upon new information.

Adaptive management, as an essential program concept, acknowledges the need to constantly monitor the system and adapt the actions to restore ecological health and improve water management. These adaptations will be necessary as conditions change and as CALFED learns more about the system and how it responds. The Program's objectives will remain fixed over time, but actions can and should be adjusted to assure that the solution is durable.

The concept of adaptive management is an essential part of every CALFED Program element, as well. In every part of the Program, new or more intensive actions are proposed. Along with these proposed actions comes uncertainty. What actions work best to achieve program objectives? How can these actions be modified to work better, cost less, or be simpler to implement? How should the emphasis among actions change over time? Are there new or different actions that should complement or replace those that are being implemented? An adaptive management approach helps to answer these questions and allows CALFED to act upon those answers.

More detailed concepts of an adaptive management approach are included in the implementation plan in Chapter 4.

3. THE CALFED PROGRAM PLAN

CALFED has developed a long-term comprehensive plan to restore ecological health and improve water management for beneficial uses of the Bay-Delta system. To achieve this mission CALFED seeks to restore ecological health, improve water quality, improve water supply reliability, and ensure levee and channel integrity. This chapter describes CALFED's **comprehensive resource management strategy** (the program plan being developed for successful implementation of the preferred alternative) and the **Preferred Program Alternative** (a concise description of program actions in Section 3.7).

The comprehensive resource management strategy distinguishes CALFED from previous efforts to solve Bay-Delta problems. The resource problems of the Bay-Delta are all interrelated, and actions to solve these problems are related as well. Thus, the actions that CALFED implements will be selected to yield multiple benefits, providing a comprehensive solution that is more effective and more efficient than single-purpose actions could be. See Chapter 4 for more specific Stage 1 actions.

The Preferred Program Alternative is a set of programmatic actions, studies, and conditional decisions. It includes the broadly described actions that set the long-term overall direction of the Program. The description of the alternative is programmatic in nature, intended to help agencies and the public make decisions on the broad methods to meet program purposes. The Preferred Program Alternative description is an important legal element of compliance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). The Preferred Program Alternative description is at the end of this chapter. The alternative is not intended to define the site specific actions that will ultimately be implemented.

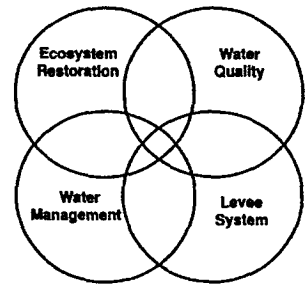
3.1 Overview of the Preferred Program Alternative

The most significant aspect of the CALFED Preferred Program Alternative is its comprehensive nature. The Program is more than a collection of diverse actions to achieve four objectives. The preferred alternative begins with strategies for solving each of the four Bay-Delta problem areas in an integrated manner. These strategies are interwoven and each must be viewed in the context of the other strategies. For example, to fully implement the Ecosystem Restoration Program, CALFED must also have a successful strategy to provide the improved water quality that is needed by the ecosystem. The levee strategy provides new opportunities for improving levee-associated habitat for Delta species. Also, water will be more available for environmental uses due to improved water supply reliability. Adaptive management is an essential program concept, part of each of these strategies. It is necessary to monitor the system continuously and adapt actions that are taken to restore ecological health and improve water management.

CALFED has developed eight programs, or categories of actions, that contribute to carrying out the strategies. These eight programs include a Long-term Levee Protection Plan, a Water Quality Program, an Ecosystem Restoration Program, a Water Use Efficiency Program, a Water Transfers Program, a Watershed Program, water storage, and Delta conveyance.

Summary of Strategies for the Four Problem Areas

Ecosystem Restoration CALFED's Ecosystem Restoration Program is the largest, most comprehensive, and most inclusive environmental restoration program in the United States. It provides a new perspective to restoration science by focusing on the rehabilitation, protection or restoration of ecological processes that create and maintain habitats needed by fish, wildlife and plant species dependent on the Delta and its tributary systems. This strategy emphasizes solid science, adaptive management and local participation: an innovative approach that is becoming a model for similar efforts throughout the nation. By restoring the natural processes that create and maintain diverse and vital habitats, CALFED aims to meet the needs of multiple plant and animal species while reducing the amount of human intervention required to maintain habitats.



Water Quality CALFED's objective is to provide good water quality for all beneficial uses, and its strategy includes reducing or eliminating parameters that degrade water quality at their sources. In addition, CALFED is committed to continuously improving source water quality that allows municipal water suppliers to deliver safe and affordable drinking water that reliably meets and, where feasible, exceeds applicable drinking water standards. CALFED Program actions will aim to reduce the levels of problem contaminants such as bromide, organic carbon, and pathogens in Delta drinking water sources.

Levees Levees are critical to the physical integrity of the Delta and Suisun Marsh, and the integrity of the state's water system. CALFED will work to reconstruct all Delta levees to an adequate base level of protection. CALFED will perform risk assessment of all factors that can contribute to levee failure and the consequences of failure to Delta land uses, the ecosystem, water quality and water supply reliability, and implement appropriate risk management considering all available options. Levee improvements will incorporate successful techniques for restoring, enhancing or protecting ecosystem values.

Water Supply Reliability The CALFED Program has proposed a Water Management Strategy to improve water supply reliability that recognizes the variability of water supply and demand in California. CALFED's water supply reliability goals are to: increase the utility of available water supplies (making water suitable for more uses and reuses); improve access to existing or new water supplies in an economically efficient manner for environmental, urban, and agricultural beneficial uses; and to improve flexibility of managing water supply and demand in order to reduce conflicts between beneficial uses, improve access to water supplies, and decrease system vulnerability.

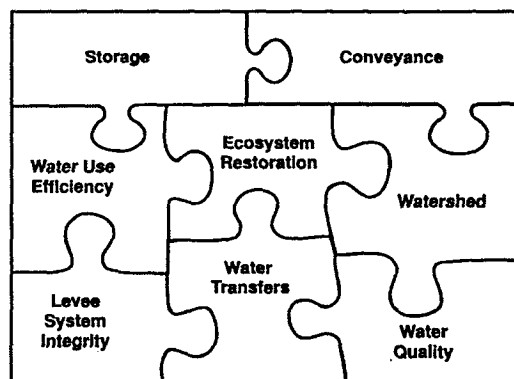
Several general categories of tools are included in the Water Management Strategy, all of which are being used in California to some degree: water conservation; water recycling; water transfers, both short-term and long-term; storage, both groundwater and surface water; water project

operations; Delta conveyance modifications; watershed management; water quality control; and monitoring and real-time diversion management.

A creative new component of this strategy is an Environmental Water Account (EWA). Through the EWA, environmental managers will control a package of assets including water and money that provides greater flexibility in helping fish species recover. With an EWA, decision-makers can react quickly to real-time assessments of fish occurrence and vulnerability instead of relying completely on fixed operational requirements based on "typical" fish behavior patterns. The EWA is described in more detail later in this chapter as an element of CALFED's Water Management Strategy.

Program Elements

CALFED developed eight programs to carry out the strategies described above. The Preferred Program Alternative is comprised of these program elements that will be implemented in stages over the next 30 years. Each of the elements contributes to improvements in the four problem areas. The program elements include:



- **Long-Term Levee Protection Plan** - Provides significant improvements in the reliability of levees in the CALFED problem area to benefit all users of Delta and Suisun Marsh water and land.
- **Water Quality Program** - Makes significant reductions in point and non-point source pollution for the benefit of all water uses and the Bay-Delta ecosystem.
- **Ecosystem Restoration Program** - Provides significant improvements in habitat, restoration of critical ecological processes and species populations, and reduces conflict with other Bay-Delta system resources.
- **Water Use Efficiency Program** - Encourages efficient use of water for agricultural, urban, and environmental purposes by providing support and incentives at the local level including expanded planning, technical, and financial assistance.
- **Water Transfers Program** - Provides a framework of actions, policies, and processes to facilitate, encourage, and streamline an active and properly regulated water market which will allow water to move between users, including environmental uses, on a voluntary and compensated basis.

- **Watershed Program** - Promotes locally-led watershed management activities and protections relevant to achieving CALFED goals through financial and technical assistance.
- **Storage** - New groundwater and surface storage will be developed and constructed, together with aggressive implementation of water conservation, recycling, and a protective water transfer market, as appropriate to meet CALFED Program goals. During Stage 1, CALFED will pursue a mix of surface water and groundwater storage. Future site-specific evaluations, environmental review processes, and permitting will be coordinated under CALFED's Integrated Storage Investigation.
- **Delta Conveyance** - CALFED will develop a through-Delta conveyance alternative based on the existing Delta configuration with some modifications, evaluate its effectiveness, and add additional conveyance and/or other water management actions if necessary to achieve CALFED goals and objectives. For example, inability to meet CALFED Program goals for drinking water quality or fishery recovery using this strategy could lead to a decision to move forward with modifications to this strategy including an isolated facility to carry a portion of export water around the Delta and/or other water management options.

All of these program elements will employ an adaptive management approach with careful monitoring of performance to help modify (adapt) future actions as more is learned about the system and how it responds. The implementation of the Preferred Program Alternative is supported by: an Implementation Plan that describes Stage 1 actions, governance, and financing; and a CALFED Science Program to carry out monitoring, assessment and research.

Staged Implementation and Staged Decision Making

The selection of a Preferred Programmatic Alternative provides the broad resource framework and strategy for implementing a comprehensive program over a period of thirty years or more. This program will be implemented in stages. The programmatic decision sets in motion the implementation of some actions, as

Staged Implementation

- **Identify certain actions at the outset (for all stages).**
- **Identify possible actions for future stages with associated conditions and linkages to guide the decisions.** This will allow some decisions when more scientific information will be available and the effects of previous actions will be better known.
- **Stage assurances that include specific agreements among agencies and stakeholders**

well as additional planning and investigation to refine other actions. The challenge in implementing the Program in stages is to allow actions that are ready to be taken immediately to go forward, while assuring that everyone has a stake in the successful completion of each stage. Throughout the implementation period, monitoring will provide information about conditions in the Bay-Delta and results of these actions, so that future actions can be adapted accordingly.

The individual actions proposed by CALFED cover a spectrum from those that are small, simple, and well understood to those that would involve major modifications to the Bay-Delta system and need additional refinement before implementation can occur. Actions carried out during Stage 1 of implementation -- the first seven years after the Record of Decision -- will generally be more straightforward actions for which there is strong scientific understanding and justification. These actions can and should be implemented quickly to achieve early program benefits. Other actions implemented early will be designed to test hypotheses and conceptual models. Results will be monitored to determine if the expected results occur. If not, subsequent actions can be modified accordingly.

Actions that will involve greater uncertainty, or will make significant or irreversible modification to the system will be implemented later during Stage 1, or in subsequent stages of the implementation period. These actions will need to be carefully planned and structured because they will be less easily modified through adaptive management.

Staged implementation for the CALFED Preferred Program Alternative involves identifying implementation actions for which there is general agreement and justification, and also developing conditions for future decisions and for moving beyond Stage 1. For some actions, predefined conditions would need to be met before actions could proceed. For example, certain conditions would be linked to decisions to construct major facilities. These linked decisions on several program elements may be required at each stage of implementation. These require assurances that linkages, such as performance measures for each program element, are satisfied before making a decision to proceed.

Like implementation, the decision process will be staged to allow better decisions in adaptive management at the appropriate time. The programmatic nature of the EIS/EIR provides the general direction for long-term implementation but not the specific information necessary for every decision required during the 30 year implementation period. Not all decisions need to, or can, be made at the outset of implementation. Therefore, stages will be identified where there are logical implementation milestones and decision making points. In this way, adaptive management can be applied equally well to a series of incremental actions such as ecosystem restoration or for major single decision projects such as surface storage.

Staged decision making also facilitates the development of program linkages and conditions. CALFED recognizes the critical importance of developing assurances mechanisms to provide stakeholder groups with some certainty that program elements will be implemented over time

and in concert with other program elements. CALFED discusses some potential linkages and conditions in Chapter 4, below, as it describes program implementation in Stage 1. Staged decision making on certain program elements provides an opportunity to evaluate and adjust the linkages and conditions to assure that the program is moving forward in a comprehensive and balanced manner.

Meeting the CALFED mission statement and goals is dependent on improvement in all problem areas (ecosystem, water quality, levee system integrity, and water supply reliability). Linkages between improvement in the problem areas are key to consistent and continuous progress towards meeting the CALFED purposes. The eight program elements and linkages between the elements are the mechanisms to achieve improvement in the four problem areas.

3.2 A Comprehensive Resource Management Program

The most significant aspect of the CALFED Preferred Program Alternative is its comprehensive nature. It is founded upon strategies for solving each of the four Bay-Delta problem areas in an integrated manner. These strategies are interwoven and each must be viewed in the context of the other strategies. This integration is also reflected in proposed Program actions. Nearly every action proposed will provide benefits in two or more resource areas at the same time, thus increasing program benefits and minimizing costs. In addition, there is synergy among actions that are geographically or functionally related. This comprehensive and integrated Program is like a braided rope: the intact rope is much stronger than the strands from which it is made.

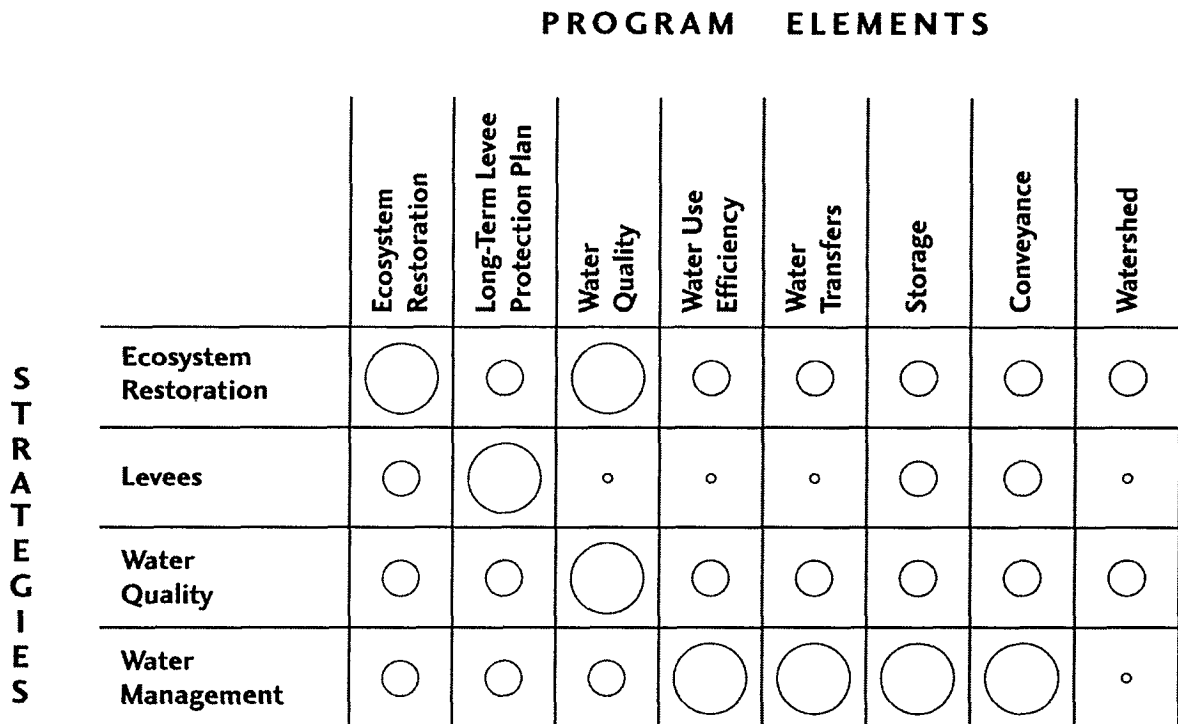
If the Program as a whole is like a rope, then the four strands in the rope are the resource management strategies that CALFED has developed. These four strategies are the ways that CALFED will restore ecosystem health, provide good water quality, maintain the integrity of the levee and channel system, and improve water supply reliability. These strategies, summarized earlier in this chapter, are described in detail below.

These four strategies reflect additional program integration. Each strategy will meet program objectives through implementation of many actions over a period of years. To simplify the discussion of the CALFED programmatic alternative, the actions are grouped under eight program elements: a Long-Term Levee Protection Plan, a Water Quality Program, an Ecosystem Restoration Program, a Water Use Efficiency Program, a Water Transfers Program, a Watershed Program, Storage, and Delta Conveyance. These eight program elements have been depicted as an interlocking jigsaw puzzle. The puzzle, however, provides an incomplete picture of the comprehensive interrelationships of program elements and resource management strategies.

To complete the rope analogy, these eight program elements are like fibers used to make up the four rope strands, which in turn are braided into a complete rope. None of the fibers or strands

by themselves are as strong as the whole rope; the strength comes from the way all the pieces are braided together.

The relationship of the four CALFED resource management strategies and the eight program elements is shown in the figure below. Each row represents a resource management strategy, and each column represents one of the eight program elements. The size of the dots estimates the relative contribution of potential actions in a program element toward meeting the objectives of each resource management strategy. This graphic shows how actions in all eight program elements may be integrated into a single resource management strategy.

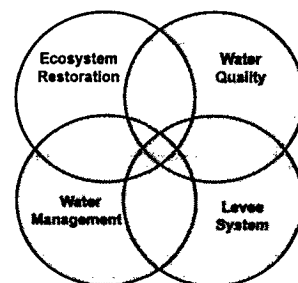


Among the eight program elements, there are comprehensive program plans for six. These plans describe actions related to ecosystem restoration, water quality, levee and channel integrity, water transfers, water use efficiency, and watershed management. These program plans are included as separate appendices to this *Programmatic EIS/EIR*. Among the eight program elements, only storage and conveyance are not described in separate program plans.

Three of these program elements -- ecosystem restoration, water quality, and levees -- correspond to broader resource management strategies. The fourth resource management strategy, CALFED's Water Management Strategy, relies most heavily on program elements for water use efficiency, water transfers, storage, and Delta conveyance. The four strategies are described in the following sections.

3.3 Ecosystem Restoration Strategy

The CALFED ecosystem restoration objective is to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plants and animal species. All CALFED program elements will contribute in varying degrees to this objective, with the Ecosystem Restoration Program (ERP) being the principal program element designed to restore the ecological health of the Bay-Delta ecosystem. The ERP includes actions throughout the Bay-Delta watershed, focusing on the restoration of ecological processes and important habitats.



Coordination and integration of actions -- not only within the CALFED Program, but among all resource management, conservation, and regulatory actions affecting the Bay-Delta System -- will be essential to successful restoration. Therefore, CALFED has proposed the establishment of a single blueprint for ecosystem restoration and species recovery. This concept is discussed in Section 3.8 of this chapter.

CALFED strives to improve ecosystem quality for the Bay-Delta system in order to reduce conflicts among beneficial uses of California's water. To help plan CALFED efforts to meet the overall objective, CALFED worked with a diverse group of representatives from CALFED agencies, academia, and the stakeholder community. They developed a Strategic Plan for Ecosystem Restoration. The Strategic Plan describes the ecosystem-based, adaptive management approach that will be used to implement the restoration program. Specifically, the Strategic Plan:

- Describes an ecosystem based management approach for restoring and managing the Bay-Delta ecosystem.
- Describes an adaptive management process that is sufficiently flexible and iterative to respond to changing Bay-Delta conditions and to incorporate new information about ecosystem structure and function.
- Describes the value and application of conceptual models in developing restoration actions and defining information needs, with examples of their development and use.
- Describes institutional and administrative considerations necessary to implement adaptive management, to ensure scientific credibility of the restoration program and to engage the public in the restoration program.

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- Presents goals and objectives for recovery of species and ecosystem restoration.
 - Presents broad issues that need to be addressed early in the restoration program.
 - Presents decision rules and criteria to help guide the selection and prioritization of restoration actions.
 - Describes the opportunities and constraints to be considered in developing a restoration program.
 - Outlines a Stage 1 action plan for selecting and implementing restoration actions during the first seven years of implementation.

An important part of the Strategic Plan is the set of goals for ecosystem restoration, which CALFED has adopted. The goals provide the basis for a vision of a desired future condition of the Bay-Delta system. They lead to a definition of what is meant by "ecosystem quality" as applied to the Bay-Delta system. These CALFED goals for ecosystem restoration are:

1. Achieve recovery of at-risk native species dependent on the Delta and Suisun Bay as the first step toward establishing large, self-sustaining populations of these species; support similar recovery of at-risk native species in the Bay-Delta estuary and the watershed above the estuary; and minimize the need for future endangered species listings by reversing downward population trends of native species that are not listed.
2. Rehabilitate natural processes in the Bay-Delta estuary and its watershed to fully support, with minimal ongoing human intervention, natural aquatic and associated terrestrial biotic communities and habitats, in ways that favor native members of those communities.
3. Maintain and/or enhance populations of selected species for sustainable commercial and recreational harvest, consistent with the other ERP strategic goals.
4. Protect and/or restore functional habitat types in the Bay-Delta estuary and its watershed for ecological and public values such as supporting species and biotic communities, ecological processes, recreation, scientific research, and aesthetics.
5. Prevent the establishment of additional non-native invasive species and reduce the negative ecological and economic impacts of established non-native species in the Bay-Delta estuary and its watershed.

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6. Improve and/or maintain water and sediment quality conditions that fully support healthy and diverse aquatic ecosystems in the Bay-Delta estuary and watershed; and eliminate, to the extent possible, toxic impacts to aquatic organisms, wildlife, and people.

The *Strategic Plan for Ecosystem Restoration* is included as another appendix to the Programmatic EIS/EIR. Consistent with adaptive management, the Strategic Plan will be refined over time as we learn more about the ecosystem and the effects of restoration actions.

Fundamental to the CALFED strategy for ecosystem restoration is the restoration of *ecological processes* associated with streamflow, stream channels, Delta channel hydraulics, watersheds, and floodplains. These ecological processes create and maintain habitats essential to the life history of species dependent on the Bay-Delta system. By restoring the natural processes that create and maintain diverse and vital habitats, CALFED aims to meet the needs of multiple plant and animal species while reducing the amount of human intervention required to maintain habitats. In addition, the strategy includes reduction in the effects of stressors that inhibit ecological processes, habitats, and species.

Representative ERP actions include:

- Restoring, protecting, and managing diverse habitat types representative of the Bay-Delta and its watershed
- Restoring timing and magnitude of critical instream flows and providing periodic high flows for channel-forming in Bay-Delta tributaries
- Increasing Delta outflow during key springtime periods
- Reconnecting Bay-Delta tributaries with their floodplains through the construction of setback levees, the acquisition of flood easements, and the construction and expansion of flood bypasses
- Developing assessment, prevention, and control programs for invasive species
- Restoring a healthy sediment regime by relocating instream and floodplain gravel mining, and by artificially introducing gravels to compensate for sediment trapped by dams
- Reducing or eliminating fish passage barriers, including the removal of dams, construction of fish ladders, and construction of best available technology fish screens

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- Targeting research to provide information needed to define problems sufficiently and to design and prioritize restoration actions

Because the Bay-Delta ecosystem is large, complex, diverse and variable, it is impossible to know with certainty how it will respond to implementation of the ERP and other program elements. Although we know much about how the Bay-Delta system functions, there are still significant information gaps that hamper our ability to sufficiently define problems and design restoration actions to solve them. To account for this uncertainty, CALFED will use an adaptive management approach to restoring and managing the Bay-Delta ecosystem. In an adaptive management approach, restoration actions are designed and monitored so that they improve our understanding of the system while simultaneously restoring it. This approach allows revision of restoration activities or better design of future restoration actions based upon the information gathered from projects implemented earlier. It also provides the flexibility required to respond to changing Bay-Delta conditions and to identify and resolve resource conflicts and trade-offs.

The Strategic Plan outlines the following steps as part of the adaptive management approach:

- Define the problem or set of problems to be addressed
- Define goals and objectives for resolving identified problems
- Develop conceptual models
- Develop and design alternative restoration or management actions
- Implement restoration actions
- Monitor the ecosystem
- Update restoration and management actions

The CALFED Science Program will provide the means to measure progress made toward the ecosystem restoration goals and objectives. It will identify the need to make changes through adaptive management and it will provide focus on research needs to reduce scientific uncertainty. The CALFED Science Program is described in greater detail in Chapter 4.

Throughout the adaptive management process, CALFED will rely on the advice of expert panels, particularly the ERP Science Review Panel that is identified in the Strategic Plan. These panels will assess the results of CALFED actions, monitoring and research data from the Science Program, and other relevant information to provide advice to CALFED regarding future monitoring, research, and program actions. Such advice will be particularly relevant to decisions on future ecosystem restoration actions, as well as decisions regarding future conveyance and storage actions that will affect ecosystem restoration. CALFED will use this adaptive management process to refine and implement the 600 programmatic restoration actions contained in the ERP.

ERP Priority Setting and Implementation

The ERP identifies over 600 programmatic actions to be implemented throughout the Bay-Delta system over the 30-year period of the CALFED Program. Implementation of the ERP will be carried out according to a set of broad policy principles that form the foundation for priority-setting and funding allocation decisions. These principles were developed through close collaboration between CALFED agencies and stakeholders. These principles specifically address the process for developing near-term and long-term ERP actions, the role of science-based adaptive management and the parameters for determining the balance of funding priorities and allocation. They are included as part of the ERP Strategic Plan, as follows:

Basis for ERP Implementation Priorities: The development of annual, near-term and long-term ERP implementation priorities and strategies will be based on the goals and objectives of the ERP Strategic Plan, Multi-species Conservation Strategy, ESA recovery plans, and implementation plans developed for specific ecological management zones, and informed by a science-based adaptive management process.

Role of Science: A science based adaptive management process will be used to review and advise on ERP strategies and priorities. This process will include adequate monitoring, research, and performance assessment activities, and an independent Ecosystem Science Panel. CALFED is committed to using the best available science for ERP implementation in accordance with a single blueprint.

Setting Priorities: Final decisions regarding ERP implementation strategies, priorities, and funding allocations will be made by the CALFED Policy Group or its successor entity, based on recommendations developed through a collaborative effort involving the CALFED Science Program (including an Ecosystem Science Panel), CALFED agencies, stakeholders, and the public.

Funding Priorities: ERP implementation will include strategies to address the immediate needs of species and other ecosystem components at highest risk; and comprehensive measures to protect and restore habitats, rehabilitate ecological processes, and reduce stressor impacts. The initial funding allocation between these strategies is intended by CALFED to be balanced so that the total allocation provides for a comprehensive restoration approach. Adequate funding will be provided to fully support the science-based adaptive management process and the administration and management of the ERP.

Use of ERP Funds: ERP funds will be used to implement management measures identified in the Ecosystem Restoration Program Plan, non-mitigation measures identified in the MSCS, and/or measures developed under the ERP adaptive management process.

These principles will form the foundation for integrating and selecting CALFED ERP actions and other complementary actions.

Relation to Other Program Elements

There are many linkages among the objectives in the four problem areas and among the actions that might be taken to achieve these objectives. Most actions that are taken to meet program objectives, if carefully developed and implemented, will make simultaneous improvements in two, three, or even four of these problem areas.

Water use efficiency measures include conservation of water used in urban areas, in agricultural areas, and on managed wetlands, as well as water recycling. Efficiency measures can reduce water demand, thereby reducing the mismatch between supply and demand. Efficiency measures provide other benefits to the ecosystem as well. Reduction in demand may reduce the diversion of water from the Bay-Delta system which will improve streamflow and reduce the entrainment of fish. Careful application of water to gardens, lawns and farm fields can result in less runoff of herbicides, pesticides, fertilizers, and salts back into water bodies that provide drinking water sources and aquatic habitats.

The policy framework and regulatory coordination that will come from CALFED's Water Transfers Program will make an important water management tool available. A water transfer that moves water from upstream of the Delta to Delta export regions may provide ecosystem benefits by providing increased instream flows upstream of the Delta, by increasing flow into the Delta or modifying the timing of flows in ways that may benefit the ecosystem. Transfers of water between two users in Delta export areas may reduce the need to pump water from the Delta and reduce the environmental impacts of that Delta pumping. Finally, water can be transferred from diverters to instream uses, restoring beneficial timing of flows and increasing Delta outflow during critical periods. When it is necessary to meet streamflow targets above regulatory baseline flows, CALFED will pursue the acquisition of water from willing sellers. A functional water market, open to environmental buyers, will be essential to maintaining flows and habitats during critical periods.

The Environmental Water Account (EWA), described more fully later in this chapter, can be used to increase operational flexibility to help certain fish species, particularly those protected by state and federal endangered species acts, while simultaneously protecting water supply reliability and water quality. The EWA will use water purchases, storage space, and other assets to enhance upstream and in-Delta fish protection. For example, the EWA could alter the timing of water diversions from the south Delta and carry out water transfers in order to reduce entrainment and provide the migratory cues for fishes that are identified in the ERP. The EWA will use the real-time monitoring of the movement of fish in the Delta to trigger alternative water management actions at the south Delta project pumps and the Delta Cross Channel.

Through the Integrated Storage Investigation (ISI), described more fully later in this chapter, CALFED is evaluating the relationship between various types of storage within the Water Management Strategy. Surface and groundwater storage can be used to improve water supply reliability, provide water for the environment at times when it is needed most, provide flows timed to maintain water quality, and protect levees through coordinated operation with existing flood control reservoirs. In areas such as the San Joaquin River system, new storage may be an effective way to augment streamflows during periods of shortage. In the Integrated Storage Investigation, CALFED will also evaluate the modification or removal of some small dams which serve as barriers to fish migration.

The CALFED Preferred Program Alternative includes several Delta conveyance features that will protect fish, including new screens at south Delta water project intakes, an operable barrier at the head of Old River, and operations carefully guided by real-time monitoring. The Preferred Program Alternative also includes a process for determining the conditions under which any additional conveyance facilities would be needed in the future to meet ecosystem restoration objectives and fish species recovery.

Delta levee improvements reduce the risk that levees will fail during flood periods or as a result of earthquakes or gradual deterioration. This can protect not only lives and property of those who would otherwise have been flooded, but can also protect the Delta's complex habitats and critical ecological processes. In a serious levee failure, the deeply subsided islands would become embayments, channel complexity would be lost, and the rearing and foodweb function of the Delta would be significantly altered. Improvements to Delta levees can be made in ways that accommodate habitat restoration, so that levees can simultaneously protect land uses, protect water quality, and support a variety of wetland, aquatic, and riparian habitats. Waterside berms, channel islands and limited setback levees serve to bolster the integrity of the levees and to provide habitat for fish and upland plants and animals. Levee improvements in the Suisun Marsh will help protect managed wetlands and guard against adverse effects on Delta water quality from catastrophic levee failure.

CALFED actions to improve water quality focus on source control: improving the quality of water that flows through the Bay-Delta system by addressing water quality concerns at their source. In some cases this may involve cleanup of abandoned mines that leach toxic heavy metals from mine tailings. In other cases, water quality may be improved by reducing runoff and erosion on a farm or an urban landscape, improving the quality of runoff that finds its way back into streams. Many of the water quality actions are staged to provide improvements and insights critical to the successful implementation of the ecosystem restoration strategy.

Through the watershed coordination element of the Program, local watershed organizations will be better able to engage in the planning and implementation of the CALFED Program. In the lower watershed, the focus will be on ecosystem restoration and water quality actions. In the upper watersheds, the immediate focus will be on partnership projects with local entities to

improve water quality and habitat, decrease erosion, and increase base flows in the tributaries to the Delta. The coordination and outreach role of the Watershed Program will ensure cooperative and durable implementation of the ecosystem restoration strategy. Examples of watershed actions that will further the CALFED ecosystem strategy include those that improve riparian habitat along streams, increase or improve fisheries habitat and passage, restore wetlands, or restore the natural stream morphology affecting downstream flows.

An essential feature of the CALFED Program is the assurances for compliance with the State and federal Endangered Species Acts and the State Natural Community Conservation Planning Act which will derive from the Multi-Species Conservation Strategy (MSCS). The MSCS through a combination of regulation and ecosystem restoration actions will provide regulatory certainty and a framework for the acquisition of permits as the CALFED Program moves forward. The MSCS will eventually become an agreement with the agencies and user public who depend on the Delta, allowing all elements of the CALFED Program, including the ERP, to progress, by ensuring the recovery and conservation of species and habitats. The ERP will be the primary mechanism to accomplish recovery and conservation of the covered species of the MSCS. In the event that other program actions have negative effects on the ecosystem baseline, the MSCS will require mitigation measures to maintain the ecosystem at the baseline level of health.

Implementation Concerns

Agricultural Resources Many entities have expressed concerns about the effects of the CALFED Program (especially the ERP and Levee Program) on agricultural land. Agricultural resources are an important feature of the existing environment of the state and are recognized and protected under CEQA and State and federal policy. One of the major principles of the State's agricultural policy is to sustain the long-term productivity of the State's agriculture by conserving and protecting the soil, water, and air which are agriculture's basic resources. It is CALFED policy that adverse environmental effects to agricultural resources resulting from CALFED program elements, projects, and actions will be fully assessed and disclosed under CEQA and NEPA, and avoided or mitigated to the extent required by law. Assessment, disclosure, and avoidance, and other mitigation strategies will be developed at the programmatic and project-specific levels in consultation with other State, federal, and local agencies with special expertise or authority over agricultural resources which may be affected by the Program, such as the California Department of Food and Agriculture.

CALFED seeks to preserve as much agricultural land as possible during implementation in Phase III consistent with meeting all program goals. Some of the land needed for program implementation is already owned by the government and that land will be used when appropriate to achieve Program goals. Partnerships with landowners, including easements with willing land owners, will be pursued when appropriate to obtain mutual benefit if the appropriate government land is not available for the intended purpose. Acquisition of fee title to land will be from

willing sellers only, and will be used when neither available government land nor partnerships are appropriate or cost effective for the specific need.

Numerous activities and programs are ongoing or proposed that would generate a negative impact to agriculture by expanding habitat for fish and wildlife. Examples are actions being taken through the Central Valley Project Improvement Act and the Central Valley Habitat Joint Venture to protect and restore significant areas of land in the Central Valley. To the extent that these activities and programs establish habitat that helps to meet CALFED objectives, that habitat reduces the amount of habitat restoration that CALFED must carry out. Coordination of actions will help minimize impacts. Also, to the extent that these activities and programs propose water acquisition for specific watersheds that is also proposed by CALFED, that water reduces the amount of water that CALFED must acquire. Careful coordination will help ensure that all agencies' restoration programs are carried out in the most efficient way.

The *Programmatic EIS/EIR* evaluates impacts (both adverse and beneficial) of the CALFED alternatives on agricultural resources.

San Francisco Bay Several entities have expressed concern that CALFED is not directly focusing on promoting the health of San Francisco Bay, particularly the Central and South Bay areas. It is true that the Program has not included San Francisco Bay as part of its defined problem area (which includes the legally defined Delta, Suisun Bay extending to Carquinez Strait, and Suisun Marsh). Nevertheless, because the Bay-Delta system is part of a larger water and biological resource system, solutions to address the problems in the system will include a broader geographic scope extending both upstream and downstream. This solution scope includes San Pablo Bay, San Francisco Bay, and portions of the Pacific Ocean out to the Farallon Islands. In particular, the Program will address interactions between the Delta and San Francisco Bay, such as flow or sediment, by examining the "inputs" and "outputs" from the defined problem area. In addition, given CALFED's solution principle that solutions should have no significant redirected impacts, consideration needs to be given to how each alternative might negatively affect San Francisco Bay. The Programmatic EIS/EIR evaluates impacts (both adverse and beneficial) of the CALFED alternatives on the San Francisco Bay region.

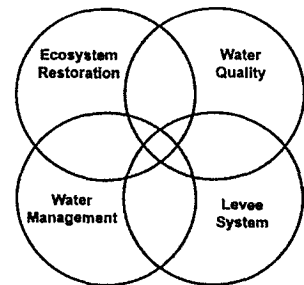
San Joaquin River Many stakeholders have recommended that CALFED give serious consideration to restoring salmon runs below Friant Dam on the San Joaquin River as a means of attaining ERP goals. CALFED will evaluate fishery restoration in the mainstem San Joaquin River as a part of the ERP, while keeping in mind the specific hydrological and water management considerations in the San Joaquin basin. CALFED is aware of the historic agreement reached between stakeholder groups in March 1999 to attempt a negotiated settlement to restore aquatic resources below Friant Dam. CALFED will monitor the progress of these negotiations, with the goal of assuring that CALFED ERP actions are consistent with and supportive of any potential settlement.

More information on the ecosystem restoration program is included in other volumes of the *Programmatic EIS/EIR*, including the *Ecosystem Restoration Program Plan*, volumes I and II, and the *Strategic Plan for Ecosystem Restoration*. Volume I contains vision statements that describe the ecological attributes and desired future Bay-Delta conditions; Volume II outlines over 600 programmatic restoration actions for the 14 ecological management zones delineated within the Bay-Delta ecosystem.

3.4 Water Quality Improvement Strategy

CALFED is committed to achieving continuous improvement in the quality of waters of the San Francisco Bay-Delta estuary with the goal of minimizing ecological, drinking water, and other water quality problems, and to maintaining that quality once achieved. This objective extends to the watersheds of the estuary to the extent that water quality problems in these watersheds affect beneficial uses dependent on the estuary.

"Continuous" as used here means a steady or step-wise trend over the 30-year time horizon of the CALFED Program, and does not include short-term fluctuations that may be brought about by wet or dry hydrologic conditions, other shorter term, temporary, events or time needed to initiate and implement improvement measures. Although specific water quality targets have been established to gauge the success of the Water Quality Improvement Strategy, CALFED will seek to achieve water quality that exceeds these targets where feasible and cost effective. At the same time, it is anticipated that periodic re-evaluation of water quality targets will be a feature of adaptive management within this strategy.



Success in achieving the CALFED water quality objective will depend upon close coordination and collaboration among CALFED, responsible State and Federal agencies, and local agencies and interests. The CALFED Program will emphasize voluntary, cooperative, incentive-based efforts to improve water quality, but CALFED will work with regulatory agencies to assure program goals are accomplished where voluntary efforts prove insufficient. For example, some of the problems identified in this strategy will be subject to a Total Maximum Daily Load (TMDL) process pursuant to the Clean Water Act. CALFED is providing a forum with regulatory agencies and stakeholders to ensure that the TMDL and CALFED efforts are closely coordinated and complementary.

CALFED's primary water quality improvement strategies are for environmental water quality and drinking water quality. They are similar in their fundamental approaches, but are different enough to merit separate description.

Environmental Water Quality Improvement Strategy

CALFED's environmental water quality goal is to provide water in the Bay-Delta system that is of sufficient quality to protect all ecological beneficial uses of the water. For many water quality parameters, numerical and/or narrative objectives exist in water quality control plans adopted by the SWRCB and Regional Water Quality Control Boards. CALFED will use these objectives where appropriate as its targets for water quality improvement.

Water quality improvement is a key element of the ecosystem restoration strategy. Several water quality components have been found in the Delta at levels that could cause chronic or acute toxicity to aquatic and terrestrial organisms. Toxicity testing in the Delta and the two main tributaries, the San Joaquin River and the Sacramento River, have shown that Bay-Delta water is frequently toxic to some test species. Additionally, State and federal agencies are required to compile a list of those waters that do not meet a standard of water quality that is protective of the beneficial uses of that water body. That list was used to develop a portion of the scope of the Water Quality Program.

CALFED has identified several constituents of concern for which individual actions and studies have been proposed. Similar to the drinking water quality improvement strategy (discussed below), the individual strategies for the environmental constituents of concern contain actions such as source reduction and mine remediation. The studies proposed include source identification, interaction with the environment, and bioavailability. Each strategy is composed of a combination of actions and studies that will be developed and performed under the scrutiny of a public advisory group. Both the studies and actions must be conducted with continuous monitoring and assessment.

The major areas that have been identified for action and the basic programmatic actions are:

- **Low Dissolved Oxygen and Oxygen-Depleting Substances (in the lower San Joaquin River, South Delta, and elsewhere)** - Reduce impairment of rivers and the estuary caused by substances that exert excessive demand on dissolved oxygen. Oxygen depleting substances are found in waste discharges, agricultural discharges, urban storm water, feedlot discharges, sediment, and algae.
- **Mercury (the Sacramento River, Cache Creek, the Delta, and the Bay)** - Reduce mercury in rivers and the estuary by source control at inactive and abandoned mine sites. Determine current mercury levels in water, sediment and fish in the estuary, rivers and affected tributaries. Implement comprehensive monitoring and research program to determine loadings and sources of total and methyl mercury, transport of mercury in sediment, factors affecting mercury transformation and bioaccumulation in the estuary, and concentrations of mercury

in indicator species. Use this information to prioritize remediation or cleanup of mercury sources.

- **Pesticides (from urban and agricultural uses of current pesticides)** - Reduce impacts of pesticides (including diazinon and chlorpyrifos) through development and implementation of Best Management Practices, for both urban and agricultural uses, and support of pesticide studies for regulatory agencies while providing education and assistance in implementation of control strategies for the regulated and unregulated pesticide users.
- **Organochlorine compounds (compounds like DDT and PCBs)** - Reduce the load of organochlorine compounds in the system, including residual DDT and chlordane, by reducing runoff and erosion from agricultural lands through Best Management Practices. Sediment control will also protect valuable topsoil and prevent costly maintenance of drainage systems.
- **Salinity (concentrated mostly in the San Joaquin Valley)** - Actions are planned to reduce salt loads in agricultural drainage and in urban and industrial waste water to protect drinking and agricultural water supplies, and to facilitate development of successful water recycling, source water blending, and groundwater storage programs. For the San Joaquin River watershed, a strategy will be developed using a continuous monitoring technology to minimize water quality impacts of salt movement through the system. This strategy will be consistent with CVPIA and Vernalis Adaptive Management Plan (VAMP) requirements. CALFED will not pursue resolution of salinity problems of the San Joaquin Valley through a San Joaquin Valley Drain, which is beyond the scope of the CALFED Program. Long term solutions will be sought through the San Joaquin Valley Drainage Implementation Program, with CALFED support. Salinity in the Delta will be controlled both by limiting salt loadings from its tributaries, and through managing seawater intrusion by such means as using storage capability to maintain Delta outflow and to adjust timing of outflow, and by export management.
- **Selenium (a naturally occurring salt in the San Joaquin Valley that gets concentrated in agricultural drainage, and a component of Suisun and San Pablo Bay petroleum refinery discharges)** - Reduce selenium impacts through reduction of loads at their sources, and through appropriate land fallowing and land retirement programs (including those under the CVPIA). In the San Joaquin River watershed, reduced loads will be accomplished through implementation of on-farm and district source control measures, development of treatment technology, implementation of projects such as the Grasslands Bypass Use Agreement (if shown effective), and appropriate land fallowing and land

retirement. Increased assimilative flows are anticipated as a result of Federal Energy Regulatory Commission actions on San Joaquin River tributaries and VAMP flows. Selenium impacts from refinery sources in Suisun Bay will be reduced by improved source control.

- **Trace Metals (from mines, agriculture, and urban areas)** - Reduce impacts of trace metals such as copper, cadmium, and zinc in upper watershed areas, near abandoned mine sites. Reduce impacts of copper through urban storm water programs and agricultural Best Management Practices. Study the ecological impacts of copper in the Delta, and determine the feasibility of copper load reduction.
- **Turbidity and Sedimentation (predominantly in the upper watershed)** - Reduce turbidity and sedimentation which affect several hydraulic areas in the Bay-Delta and its tributaries. Study ecological impacts of sedimentation. Control sedimentation in several watersheds to protect spawning beds and maintain capacity of streams.
- **Toxicity of Unknown Origin (predominantly in the Delta)** - Through research and monitoring, identify parameters of concern in the water and sediment within the Delta, Bay, Sacramento River and San Joaquin River regions and implement actions to reduce their toxicity to aquatic organisms.

Drinking Water Quality Improvement Strategy

Drinking water supplies from the Delta contain higher bromide concentrations than are found in the drinking water supplies of about 90% of the nation. Bromide reacts with disinfection chemicals to form byproducts that have increasingly raised health concerns for consumers. Most of this bromide comes from the ocean as a result of its connection with the Bay-Delta estuary. Additional pollutants of concern for drinking water include organic carbon, which also has disinfection byproduct ramifications, and pathogens.

The CALFED drinking water quality objective is to continuously improve water quality that allows for municipal water suppliers to deliver safe, reliable, and affordable drinking water that meets, and where feasible, exceeds applicable drinking water standards. The CALFED strategy for improving drinking water quality is to reduce the loads and/or impacts of bromide, total organic carbon, pathogens, nutrients, salinity, and turbidity through a combination of measures including source reduction, alternative sources of water, treatment, and storage and conveyance improvements.

CALFED's specific target for providing safe, reliable, and affordable drinking water in a cost effective way is to achieve either: (a) average concentrations at Clifton Court Forebay and other south and central Delta drinking water intakes of 50 ug/L bromide and 3.0 mg/L total organic carbon; or (b) an equivalent level of public health protection using a cost effective combination of alternative source waters, source control, and treatment technologies. CALFED has not adopted a specific numeric target for salinity (other than meeting existing Delta standards) but does have a preliminary objective of reducing the salinity of Delta supplies. Such reduction will increase the capability for blending of supplies from Delta and non-Delta sources, increase opportunities for recycling and conjunctive use, and reduce the need for additional treatment of industrial process water.

The adjacent figure lays out the drinking water quality improvement strategy to achieve this target. The strategy is composed of a combination of actions and studies developed and performed under the scrutiny of a public advisory group (the Delta Drinking Water Council, comprised of urban water

agency, environmental group, business, Delta, and public health agency representatives).

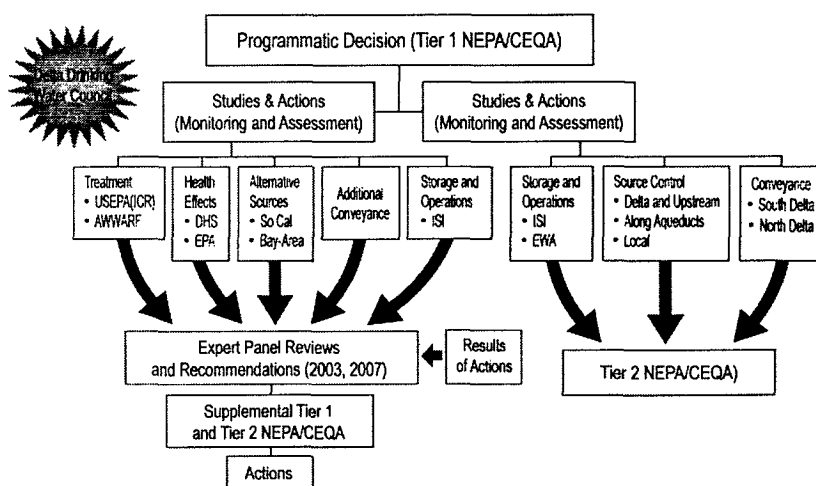
Interim milestones will be developed to help measure progress toward CALFED's public health protection objectives. The information generated by these actions and studies will serve as the basis of reviews by panels of independent experts in 2003 and 2007. These panels will be convened to assess the results of drinking water studies, to assess the continued

appropriateness of the water quality targets, and to make recommendations on future actions to improve drinking water quality. The results of the expert panel reviews will be published and will assist CALFED and the State legislature in determining which additional measures or set of measures are most appropriate to meet CALFED's public health protection objectives.

Both the water quality studies and actions to be implemented in Stage 1 must be conducted with continuous monitoring and assessment. The actions and studies to be performed as components of the strategy are described below:

- **Source Control** - CALFED will implement source controls in the Delta and its tributaries. CALFED, with CalEPA (State Water Resources Control Board and

Drinking Water Quality Improvement Strategy



the Central Valley Regional Water Quality Control Board, the Department of Health Services, and the Department of Water Resources, with assistance from the US EPA) will coordinate a comprehensive source water protection program. This program will include identification and implementation of appropriate pollutant source control measures, focused incentive programs targeting priority pollutants, development of monitoring and assessment programs, and infrastructure improvements to separate drinking water intakes from irremediable sources of pollutants. This source control program could also include projects and programs such as TOC/DOC studies/projects, Veale/Byron Tract drainage management, industrial source control measures, advanced wastewater treatment improvements, local salt removal, watershed improvements to reduce constituents of concern in the Sacramento and San Joaquin Rivers, recreational impacts on drinking water quality in the Delta and reservoirs, drainage problems in the San Joaquin Valley, and monitoring, research, and modeling.

Water that is conveyed to municipal water agencies via open aqueducts such as the California Aqueduct, the South Bay Aqueduct, and the Delta-Mendota Canal needs to be protected from degradation in those conveyance facilities by controlling sources of pollution along the aqueducts. Source control is also necessary in the watersheds that drain to local reservoirs that receive water exported from the Delta or are blended with export waters to insure that high quality is maintained. CALFED will implement appropriate physical modifications and watershed management programs to control runoff into the California Aqueduct and other similar conveyances.

- **Alternative Sources** - For both Southern California and the San Francisco Bay Area, opportunities exist to engage in water exchanges with agricultural water users and among urban users to shift higher quality supplies to urban users for drinking water while ensuring that agricultural users retain a reliable supply of water. The development of these opportunities depends heavily on the cooperation of urban users in the two identified regions with each other and with agricultural users in the San Joaquin Valley. Enabling Delta water users to substitute higher quality source water for current Delta water offers important opportunities to improve drinking water supplies. At the same time, however, CALFED will continue its commitment to assure continuous improvement in the quality of Delta water for all uses.

Specifically, CALFED will work cooperatively with Bay Area water suppliers as they develop a Blending/Exchange project which enables them to work cooperatively to address water quality and supply reliability concerns. In addition, CALFED will facilitate water quality exchanges and similar programs to

make high quality Sierra water in the eastern San Joaquin Valley available to urban Southern California interests.

- **Health Effects** - CALFED will work with the California Department of Health Services and EPA to ensure that there is adequate ongoing research on the health effects of drinking water, in particular brominated compounds that are prevalent in drinking water that comes from the Delta.
- **Treatment** - CALFED will evaluate alternative approaches to drinking water treatment to address growing concerns over disinfection byproducts, pathogens and salinity. Recent private sector efforts have generated substantial advances in treatment technologies. CALFED will encourage these technologies by funding a demonstration UV disinfection plant as well as funding other demonstration projects to design and operate desalination facilities for agricultural drainage using membrane treatment technology and focusing on management of brines and on-site waste stream management, and other promising treatment technologies that arise during the Program.

EPA is engaged nationally in collecting information from water utilities regarding the effectiveness of source control and treatment. This effort is known as the Information Collection Rule. It will provide a basis for considering improvements to existing drinking water treatment technology. The American Water Works Association Research Foundation (AWWARF) is engaged in ongoing research regarding methods to improve drinking water quality. CALFED will work with water utilities to ensure that EPA's and AWWARF's efforts continue to be useful to water suppliers dependent on Delta supplies.

- **Storage and Operations** - CALFED is considering flexible management of water operations (including operation of the Delta Cross Channel) that may achieve fish protection and ecosystem benefits more efficiently than a completely prescriptive regulatory approach. These management operations may have ancillary benefits for source water quality. In addition, CALFED agencies are conducting an Integrated Storage Investigation to evaluate the relationship between various types and locations of storage and the overall role of storage in water quality improvement as part of the CALFED Water Management Strategy.
- **Conveyance Improvements** - CALFED has proposed a broad array of actions for the lower San Joaquin River and south Delta region to address ecosystem, water quality, and water supply availability concerns, including operable barriers in strategic locations to maintain adequate water quality and stages to facilitate local water supply availability. In addition, in the north Delta, CALFED has proposed study and evaluation of a screened diversion structure on the Sacramento River.

Appropriate studies of how additional conveyance improvements, including but not limited to an isolated facility, can be developed and operated need to continue so that CALFED can pursue these conveyance improvement options in a timely manner should it prove necessary to do so.

Relation to Other Program Elements

CALFED's strategy is founded on reducing or eliminating parameters that degrade water quality at their sources. However, other components of the CALFED Program can affect water quality. Watershed activities can improve water quality in the Bay-Delta system by helping to identify and control non-point sources of pollution and identify and implement methods to control or treat contaminants in the watersheds flowing to the Bay-Delta. CALFED has developed a Watershed Program that has strong linkages to both the water quality improvement strategy and the ecosystem restoration strategy.

The two main components of the Watershed Program are to provide assistance - both financial and technical - to local watershed programs, and to promote collaboration and integration among local watershed programs and the CALFED Program. CALFED supports and encourages locally-led watershed activities that benefit the Bay-Delta system. Emphasis is placed on local leadership, recognizing that local watershed approaches may vary and that community involvement and support are essential. CALFED strives to strengthen the partnerships and relationships between the public, local watershed organizations, and governments at all levels. Watershed activities included in the Watershed Program should ensure that adaptive management processes can be applied at multiple scales and across ownerships.

In summary, the Watershed Program Plan includes the following elements:

- **Support Local Watershed Activities** - Implement watershed restoration, maintenance, and conservation activities that support the goals and objectives of CALFED.
- **Coordination and Assistance** - Facilitate and improve coordination and assistance between government agencies, other organizations, and local watershed groups.
- **Watershed Monitoring Assessment** - Facilitate monitoring efforts that are consistent with the CALFED Science Program's protocols and support watershed activities that ensure adaptive management processes can be applied.
- **Education and Outreach** - Support resource conservation education at the local watershed level and provide baseline support to watershed programs.

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- **Watershed Processes and Relationships** - Identify the watershed functions and processes that are relevant to the CALFED goals and objectives, and provide examples of watershed management activities that could improve these functions and processes.

Surface and groundwater storage along with Delta conveyance improvements can help in the management of inflows to and exports from the Delta. These improvements could be used to improve drinking water quality as well as to provide additional ecosystem protection and enhance water supply reliability. Adaptive management principles will be used to balance operations to meet these objectives. A cooperative study led by CALFED and several urban stakeholders was recently initiated to explore the potential for water quality improvements through management of water project operations. As a starting place, the group considered the potential for water quality improvements using the system flexibility provided by the Delta conveyance improvements expected during Stage 1 of implementation of the CALFED Program. Several potential measures were identified, including increasing Delta outflow in the fall, alteration of export pumping patterns to avoid elevated levels of salinity and TOC, and methods of separating relatively high and low quality supplies during conveyance after export from the Delta. Preliminary results indicate that reductions in salinity of 10 to 20 percent are possible. However, these water quality improvements are possible only when dedicating system flexibility to this objective; when the water projects are operated in this manner, water supply reliability benefits of the Delta conveyance improvements are reduced. The ISI will include more refinement and analysis of operational concepts for water quality improvement.

Water use efficiency measures can improve water quality entering the Delta by reducing some agricultural and non-agricultural discharges containing pollutants. Ecosystem restoration actions may degrade drinking water quality by increasing organic carbon loads; therefore these actions will need to be structured so as to minimize adverse water quality impacts while meeting the objectives of the ERP.

Water quality can affect the ability to expand water use efficiency measures such as conservation, water recycling, and conjunctive use, all of which depend on the availability of high quality water to prevent salt damage of irrigated land or groundwater basins, prevent corrosion of industrial equipment, and to achieve blended water salinity objectives.

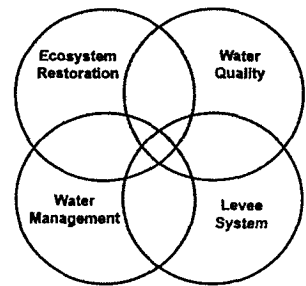
In the event of a catastrophic levee failure in the Delta, the amount of saline water entering the system could make Delta waters unusable for many months. Besides making the water unusable for agricultural, industrial, or domestic purposes, it could also have a detrimental effect on habitat quality. Therefore, it is difficult to overestimate the importance of a successful Delta levee program to achieving and maintaining good water quality for the beneficial uses of Delta waters.

The CALFED Science Program will be the primary vehicle for measuring the extent to which continuous water quality improvement is achieved. Performance will be measured by comparing ambient water quality (where appropriate) to specific water quality objectives that have been established for the parameters of concern.

More information on CALFED's Water Quality Program is included in another appendix to the *Programmatic EIS/EIR*, the *Water Quality Program Plan*.

3.5 Levee System Improvement Strategy

Delta levees and islands are the most visible anthropogenic features of the Delta. Levees are an integral part of the Delta landscape and are key to preserving the Delta's physical characteristics and processes including definition of the Delta waterways and islands. Levees also protect Delta land uses including agriculture, as well as terrestrial habitat in the Delta. Given the numerous public benefits protected by Delta levees, the focus of the CALFED strategy is to improve levee integrity. The principal program element to accomplish this will be the Long-Term Levee Protection Plan. It describes actions that will result in subsidence reduction, management, and reversal, which helps long-term Delta system integrity; increased reliability for water supply needs from the Delta and in-Delta water quality; increased reliability for in-Delta land use; and increased reliability for in-Delta aquatic and wildlife habitat.



The levee plan will build on the successes of existing programs in achieving its goals. There are five main parts to the levee plan:

- **Base-Level Protection Plan** - Base-level funding will provide equitably distributed funding to participating local agencies in the Delta. One of the primary goals of the CALFED Program is to reconstruct all Delta levees to a particular standard. CALFED has tentatively selected the U.S. Army Corps of Engineers PL 84-99 standard. Base level funding will provide for reconstruction and maintenance of Delta levees to the PL 84-99 standard. Required levee work may include removal of vegetation and debris, maintenance of water control devices, repair or replacement of existing bank protection, addition of material to achieve required cross section, removal of flood deposits, extermination of burrowing rodents and crustaceans (mitten crab), repairing and shaping access roads, repairing slipouts and erosion damage, dredging as required for minor repairs, controlling vegetation on the waterside of the levee, and other actions necessary to maintain levee integrity and appurtenances. This component will be coordinated with the Delta Levee Subventions Program currently administered by DWR.

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- **Special Improvement Projects** - The special improvement project funding continues a funding mechanism for special habitat improvement and levee stabilization projects to augment the base-level funding, within specific policy guidelines. Under the special improvement projects, flood protection would be enhanced for key islands that provide statewide benefits to the ecosystem, water supply, water quality, economy, and the infrastructure. Special improvement project funding is based on the benefit to the public, not solely on the need for improvement. This component will be coordinated with and build on the successes of the Special Flood Control Protections Program which is currently administered by DWR.
 - **Delta Island Subsidence Control Plan** - Numerous factors including oxidation, compaction and erosion of peat soils have caused some Delta islands to subside several feet below sea level. Today, these islands, and the environmental and water resources dependent upon them, are protected from seawater inundation by a network of Delta levees. The Levee Program will implement current BMPs to control subsidence on levees and coordinate research to quantify the effects and extent of inner-island subsidence as it relates to all CALFED objectives. Subsidence control measures will be implemented through the base-level protection component of the Levee Program and supplemented by research grants to develop BMPs through the CALFED Science Program. If cost effective and feasible, interior island subsidence and control measures will be recommended by CALFED during Stage 1.
 - **Emergency Management Plan** - The most recognizable threat to Delta islands and resources in the Delta is inundation due to winter flood events. In addition, other potential disasters can be caused by high tides and high winds, earthquakes, burrowing animals whose actions can cause levees to fail, toxic spills, failure of Delta levees during low flow periods, and fire. Approximately 20 islands have flooded since the 1960s, including repeated flooding of some islands. The emergency management plan will build upon existing State, federal, and local agency emergency management programs to improve protection of Delta resources in the event of a disaster.
 - **Delta Levee Risk Assessment and Risk Management Strategy** - Delta levees and islands are at risk of failure from floods, seepage, subsidence, earthquakes, and other threats. The Levee Program will quantify the risks to Delta levees, evaluate the consequences, and develop an appropriate risk management strategy. See the following text box for more information.

Additionally, CALFED is including the Suisun Marsh levee system in the Levee Program and is considering the following two options for marsh levees:

1. Include all the exterior Suisun Marsh levees (approximately 230 miles) into CALFED's Levee Program. The existing "Suisun Marsh Exterior Levee Standard" would be adopted.
2. Protect part of the levee system. Reconfigure the Marsh to protect existing managed wetlands and develop new tidal wetlands.

Identifying and Managing the Risks to Delta Levees

Delta levees and islands are at risk of failure from earthquakes, floods, subsidence, seepage and other threats. The Levee Program is taking steps to identify the risks to Delta levees and present a suite of options to manage this risk.

Over the past 25 years, the existing Delta levee program has reduced the flood and seepage risk by improving Delta levees. Research and demonstration projects are being conducted to quantify the effects of subsidence and determine how to reduce its threat to Delta levees.

Over the past year, a seismic risk assessment was made by a group of experts in the fields of seismology and geotechnical engineering. The results of this investigation are listed in Appendix G of the Levee System Integrity Program Plan.

In an effort to further quantify the risks to levee dependent systems, CALFED will augment this group based on stakeholder recommendations, and charge them with the following tasks:

1. Design and perform a risk assessment. Identify contributors to levee risk and quantify the risk to levee dependent systems.
2. Provide recommendations for seismic upgrades to critical Delta levees and other measures to reduce levee failures. Include an evaluation of the reduction in levee vulnerability and cost estimates, (\$/mile), for various recommendations.
3. Review the Subsidence Subteam's report and comment on the concept of a zone of influence and the influence of inner island subsidence on levee integrity.
4. As a component of CALFED's Science Program, review the Levee Program's scope, particularly the recommendations for subsidence, emergency response, and seismic risk assessment. Comment on the proposed scopes and develop cost estimates for completing the monitoring, assessment and research.

Once the risk to Delta levees and the systems dependent on them is quantified and the consequences evaluated, CALFED will implement an appropriate risk management strategy.

Several risk management options have been developed for inclusion in the CALFED Preferred Program Alternative. The available risk management options include but aren't limited to:

- Improving emergency response capabilities
- Developing storage south of the Delta
- Reducing the fragility of the levees
- Improving through-Delta conveyance
- Releasing more water stored north of the Delta
- Restoration of tidal wetlands
- Controlling and reversing island subsidence
- Curtailing Delta diversions
- Continued monitoring and analysis of total risk
- Constructing an isolated facility

The final Risk Management Plan may include a combination of these options and others identified as a result of the risk assessment.

Relation to other Program Elements

The CALFED levee system improvement strategy relies principally on the Long-Term Levee Protection Plan. The most important program linkages are with ecosystem restoration, storage, and conveyance.

CALFED seeks to reduce the conflict between protection of wildlife habitat that occurs on levees and maintenance of the levees to prevent their failure, and is working to minimize potential conflicts and identify key areas where ecosystem restoration actions and levee maintenance actions can be coordinated. Another area of overlap between the Levee Program and the Ecosystem Restoration Program concerns efforts to reduce or reverse subsidence and actions to restore habitat. Both the Delta ecosystem and levee system stability can benefit from reducing land surface subsidence adjacent to levees. The creation of shallow-wetland habitat serves to reduce or reverse subsidence.

An area of common concern for levee and channel maintenance and water quality protection is toxicity of sediments and water quality impacts from dredging. Research to resolve dredge permitting issues will provide useful information for protecting water quality. Dredge permits will be required in order to use dredged materials to create shallow-water habitat. Thus, efforts to resolve dredge permitting issues related to levee and channel maintenance also will benefit the ecosystem restoration. Also, the success of the South Delta modifications is dependent on being able to dredge in a timely and effective manner.

Reservoir storage and levees function as a system with regard to flood control. CALFED proposals for setback levees are included in the Ecosystem Restoration and Conveyance actions. These actions may improve levee system integrity.

Watershed management actions may reduce the risk of levee failures by moving the timing, variability, and duration of floodplain inundation and water table elevation closer to an undisturbed condition through meadow restoration and wetland development.

Two major Corps studies will provide significant inputs to the implementation of the Long-Term Levee Protection Plan. The Sacramento -- San Joaquin Delta Special Study may provide project specific recommendations which Congress could authorize for implementation of the Delta levees. The Sacramento and San Joaquin River Basins Comprehensive Study is developing a system-wide flood management plan for the Central Valley to reduce flood damage and integrate ecosystem restoration. Other related Corps studies include project specific investigations on the Lower Sacramento River, the Cosumnes and Mokelumne Rivers, the San Joaquin and Tributaries, and the Western Delta Islands.

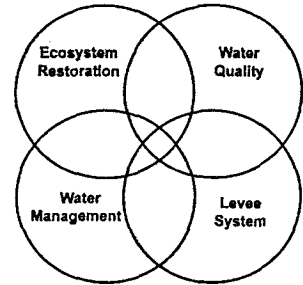
More information on the levee program is included in another appendix to the *Programmatic EIS/EIR*, the *Long-Term Levee Protection Plan*.

3.6 Water Management Strategy

3.6.1 Developing a Water Management Strategy

CALFED's fourth broad, comprehensive strategy is the Water Management Strategy. The Water Management Strategy has three broad purposes:

- Develop a menu of water management tools that can be used to attain CALFED's water supply reliability goals.
- Identify specific water management tools from this menu which will be implemented in Stage 1 of the CALFED Bay-Delta Program.
- Provide a long-term decision making framework for evaluating the success of implementation efforts and for selecting additional tools needed to achieve CALFED's objectives.



Chapter 2 of this report highlighted the substantial variability of California's hydrological cycles and water demands from agricultural, urban, and environmental uses. To respond to this variability, and in light of the substantial need to improve water management in California, CALFED must integrate all available tools in the Water Management Strategy.

Defining Water Supply Reliability Objectives

CALFED's broad objective for water supply reliability is to "Reduce the mismatch between Bay-Delta water supplies and current and projected beneficial uses dependent on the Bay-Delta system." CALFED has amplified this objective by developing a three-part strategy to improve water supply reliability. To guide the implementation of this multi-part strategy, CALFED has identified three primary goals. These goals are as follows:

- **Goal A:** Increase the utility of available water supplies (making water suitable for more uses and reuses).
- **Goal B:** Improve access to existing or new water supplies, in an economically efficient manner, for environmental, urban and agricultural beneficial uses.
- **Goal C:** Improve flexibility of managing water supply and demand in order to reduce conflicts between beneficial uses, improve access to water supplies, and decrease system vulnerability.

Evaluating Water Management Tools

The menu of tools that will be used to achieve the goals and objectives of the Water Management Strategy encompasses many of the CALFED program elements. The primary tools include:

- Water Use Efficiency Program (agricultural, urban, and wetland water conservation and water recycling)
- Water Transfer Program
- Conveyance, including South Delta Improvements
- Storage
- Operational strategies, such as real-time diversion management

Each of these primary tools is discussed in detail below. In addition to these primary tools, the Water Management Strategy will rely on additional CALFED Program tools to provide additional benefits. These include the Watershed Program, Water Quality Program, and real-time monitoring through the Science Program.

In evaluating and developing an initial set of water management tools, CALFED considered the relative ability of the tools individually and in combinations to satisfy the CALFED solution principles. Some examples of these considerations are:

Affordability The cost of tools differ substantially. One important measure of cost is the estimated cost per acre-foot of water supply. Some estimates of this cost measure have been generated by CALFED in an economic evaluation of water management alternatives.

Although cost per acre-foot is an important cost measure, other cost factors must also be assessed. For example, the cost of water will further increase depending on improvements required to meet water quality objectives (salinity, mercury, etc.). Depending on the water source, the costs for source control measures and treatment measures will vary. These cost differences are important in decisions regarding levels of investment in watershed actions and treatment actions to attain water quality goals. Finally, there are also significant regional differences with respect to the suitability and cost of tools.

Reducing Conflicts in the System Increased flexibility is essential to reducing conflicts in the system. The various water management tools offer different levels of adaptability to varying hydrologic conditions and management objectives. For example, many water conservation measures have substantial benefits in reducing overall demand, but, once implemented, do not provide flexibility to react to changes in hydrological circumstances. Surface storage facilities

are very effective at providing a rapid reaction in either releasing or collecting large amounts of flow. In contrast, although groundwater storage may hold more volume, it is slower to fill and extract, and would have to be operated in conjunction with surface storage to attain the same level of flexibility. Thus, it is important to consider the system flexibility improvements provided by combinations of tools as well as individual tools.

Have No Significant Redirected Impacts Water management tools differ in their potential effects on environmental resources. Generally, water conservation measures are viewed as more environmentally benign, given that they may reduce demand, increase flows in certain reaches of rivers, and improve water quality. Nevertheless, even water conservation measures may have adverse environmental effects. For example, substantially increasing farm or landscape irrigation efficiency may reduce water runoff that currently sustains aquatic or aquatic-dependent ecosystems or reduce groundwater recharge.

Water storage facilities also differ in their potential effects on environmental resources. Generally, groundwater projects have more benign on-site environmental and land use impacts than surface storage. Off-stream surface storage projects generally have less environmental impacts than new on-stream projects. However, all surface and groundwater storage projects create some environmental impacts.

Economic Evaluation of Water Management Alternatives

A critical analysis in CALFED's Water Management Strategy is the Economic Evaluation of Water Management Alternatives (EEWMA). The EEWMA provides important economic information that can help define potential opportunities for implementing water management tools. As an initial effort, a broad programmatic assessment was conducted to provide guidance on the initial mix of tools to be included in the Water Management Strategy.

The initial, programmatic evaluation shows how water demands shift with the cost of water, and arrays supply options by costs and by yield for each of five regions within the CALFED solution area. The "supply options" are urban and agricultural water use efficiency, urban recycling, active conjunctive use, new surface storage, and voluntary water transfers made possible through water conservation or agricultural land fallowing. For the programmatic evaluation, estimates were made of the general quantities of water available (yield) at various unit prices for the different supply options. Recognizing that policies, regulations, or other decisions can change the cost, yield, and availability of each water supply tool, the evaluation develops supply and demand scenarios which reflect varying constraint sets suggested by stakeholders. The analysis then displays consequences of these preference-based scenarios for availability and cost of water supplies throughout the system. This approach shows stakeholders and agencies how limiting or emphasizing certain supply options can change the overall cost and feasibility of achieving improvements in water supply availability. Although the analysis includes some costs reflecting differences in water quality for drinking water sources, the EEWMA does not seek to incorporate the full environmental or socioeconomic consequences of various supply options.

The EEWMA provides information on the relative effectiveness of the water management tools, but does not present the complete answer. The economic information must be supplemented by other descriptions of the opportunities, limitations, and interrelations of the tools for example, overall operational flexibility and socioeconomic and environmental impacts. One general finding from this work is that all types of water management tools evaluated (e.g. water use efficiency measures, water transfers, and storage) could play a role in meeting CALFED's water supply reliability goals. More detailed economic evaluations will continue in Stage 1 and be included in site-specific studies.

Interrelationships, Opportunities, and Limitations of Tools

As discussed above, no single water management tool or CALFED program element can adequately address all the needs for improving water supply reliability. CALFED's Water Management Strategy employs a combination of water management tools to meet the Program's water supply reliability goals and objectives. Later in this chapter, CALFED's evaluation of the potential and status of each primary water management tool is discussed in detail. First, however, the following discussion will highlight the interrelationships and potential strengths or weaknesses of the various water management tools.

Water Transfers The term "water transfers" generally means the redirection of water initially acquired pursuant to a water right, a contract, or by groundwater extraction from one user to another on a voluntary and compensated basis. CALFED's Water Transfer Program proposes a framework of actions, policies, and processes that, collectively, will facilitate water transfers and further development of a state-wide water transfer market. Because water transfers can affect third parties (those not directly involved in the transaction) and local groundwater, environmental, or other resource conditions, the framework also includes mechanisms to provide protection from such impacts.

Transfers are closely linked with other water management tools. For example, water saved by implementing water use efficiency measures is potentially available for transfer to another use. Similarly, new storage or conveyance improvements could provide access to additional water available for transfer, and can facilitate additional transfers between users. Water transfers also have the potential for affecting water quality conditions, either positively or negatively, if the transfer changes the timing of a water use or instream flow.

CALFED envisions that voluntary, compensated long-term and short-term water transfers will be the primary source of the water needed under the Ecosystem Restoration Program for restoring critical instream flows and improving Delta outflow during key springtime periods. Also, to function adequately, the Environmental Water Account will require the capability to purchase and transfer water for modifying export pumping, instream flows and Delta flow patterns.

Agricultural Water Conservation Improved agricultural water conservation can result from management and technical improvements at both the irrigation district and farm level. The

potential benefits of conservation include reductions in diversions, reductions in percolation to salt sinks, reductions in evapotranspiration, and/or reductions in contaminated runoff.

As a water management tool, agricultural water conservation can assist in meeting CALFED's water utility and water access goals. Reductions in pollutant discharges can increase the utility of the water for subsequent uses. Water made available through conservation measures can be used to firm up water supply reliability on the farm or potentially can be made available to other users through water transfers or reduced diversions.

Urban Water Conservation Urban water conservation also helps meet CALFED's water utility and water access goals. Most major California urban areas discharge wastewater into the Pacific Ocean. In these areas, urban water conservation will directly reduce per capita water use and may reduce total urban demand for water. While making better use of urban water supplies is an important component of CALFED's Water Management Strategy, urban water conservation can have a negative effect on system flexibility. As more water conservation measures are implemented as part of the normal water use pattern, additional conservation will be more difficult to achieve, more costly, or behavioral changes will be required of users to conserve more water to respond to shortages.

Managed Wetlands Water Conservation Managed wetlands are those wetland areas controlled by private owners or public agencies that rely on delivered water for some or all of their water supplies. Managed wetlands water conservation can help meet CALFED's water utility and water access goals.

Water Recycling Water recycling can help attain CALFED's water utility and water access goals. Water recycling involves reusing water that is not consumptively used during a previous application. Recycled water can be used to recharge groundwater, with a level of treatment, or can be used as a substitute supply with a lesser level of treatment in areas where high quality is not needed (e.g. golf courses). Urban areas have a very high potential for reuse, on the order of 1-2 MAF/year, though the cost can be quite high. However, it is a very reliable source of water and can have among the least environmental impacts of any of the water management tools.

Other CALFED water management tools have a direct effect on the success of water recycling programs. The ability to recycle water is highly dependent on the total dissolved solids (TDS) in the water. Each use of water adds salts to the water, so lower TDS source water provides more opportunities for recycling or blending with other sources than source water higher in TDS. Water quality control measures, operational changes, and improvements in storage and conveyance can all increase the recycling potential.

Storage Surface and groundwater storage can make major contributions to each of the water supply reliability goals, but is especially helpful in improving overall system flexibility. As a water management tool, storage also has some negative aspects, including its cost and adverse environmental impacts of site development and of water diversion to storage.

Groundwater and Conjunctive Use - Groundwater storage is usually the least expensive type of storage, can be implemented most rapidly, and results in the least environmental impacts. However, groundwater storage is less flexible than surface storage. Fill rates are constrained by the size of distribution systems and by the rate at which water can be introduced into the ground or recharged in-lieu. Extraction rates are limited by the rate at which water can be pumped from the ground. In addition, groundwater storage projects frequently generate concerns about effects on nearby groundwater quantity and quality. Under many groundwater conjunctive use operations, surface water is used more in wetter years allowing underlying groundwater aquifers to recharge naturally, and from percolation from applied water. During dry years, water is pumped from storage to meet consumptive uses, allowing less reliance on surface water supplies.

Surface Storage - Surface storage is generally more flexible than groundwater storage, depending on operating criteria. Water in surface storage can be quickly stored and quickly released when needed, although offstream surface storage fill and release rates can be quite constrained. The environmental impacts (both on-site and from diversion) and relatively significant costs of new surface storage are the main disadvantages.

Hydropower Reoperation - AB 1890 (Chapter 854, Statutes of 1996, Public Utilities: electrical restructuring) has triggered an evaluation and potential divestiture of some or all of the existing facilities in the Bay-Delta system dedicated to the generation of hydroelectric power. There is potential to re-operate some of these hydroelectric facilities to produce water supply or ecosystem benefits. CALFED conducted an initial evaluation of the potential for re-operation of existing hydroelectric facilities and concluded that there is limited potential for re-operation to meet CALFED water management objectives, but there may be more potential to meet local water management objectives or ecosystem restoration objectives.

Conveyance Improved conveyance can potentially contribute to each of CALFED's water supply reliability goals, but makes its major contribution to system flexibility. Conveyance changes can also improve water quality for some diverters. As discussed below, CALFED has incorporated the South Delta Improvements program to address conveyance improvements and related problems in Stage 1.

Watershed Management As a water management tool, the CALFED Watershed Program can help meet the goals for improving the utility of water and access to water. By reducing natural and artificial pollutant loads in waterways, the Watershed Program can increase the utility of water for downstream uses of all kinds. Similarly, watershed restoration activities can improve the ability of a watershed to retain water for all uses and to reduce adverse effects of flood events.

Water Quality Improvements Water quality improvements are essential to meeting CALFED's goal of increasing water utility. The CALFED Water Quality Program includes actions to address parameters of concern for urban, agricultural, and environmental uses of Bay-Delta waters. As discussed above, other water management tools can help achieve water quality goals. New or reoperated storage and conveyance facilities can capture higher quality flows for future uses. Water transfers can be used creatively to direct higher quality water to the more sensitive beneficial uses. Water use efficiency measures can directly reduce the volume of pollutants entering the system. Levee maintenance and improvements can increase the protection of water quality from catastrophic salinity intrusion.

Operational Strategies CALFED's Water Management Strategy includes efforts to enhance real-time monitoring to improve system flexibility and water utility. For example, the majority of fish entrainment for a particular species at water diversion facilities typically may occur during only a short period of time. If that time can be predicted in advance through a monitoring program, diversions can be curtailed and entrainment dramatically reduced with a relatively low reduction in diversion levels. Similarly, greater water diversions could be appropriate during periods when monitoring shows that entrainment is not a major issue. Real-time monitoring can also significantly improve water utility by helping coordinate operational changes for biological benefits with other needs such as water quality. Monitoring is essential for the success of every water management tool so that progress can be measured and adjustments made where necessary. CALFED's Science Program will provide appropriate real-time monitoring to enhance the effectiveness of the CALFED Water Management Strategy.

Comparison of Tools The chart on the following page compares how different water management tools contribute to CALFED's water supply reliability goals. None of the individual water management tools meet all of the goals and each tool provides somewhat different opportunities and limitations. A combination of water management tools will be necessary to provide significant improvement in water supply reliability.

Water Supply Reliability Goals & Objectives	Water Management Tools												
	Long-Term and Short-Term Water Transfers	Water Conservation			Water Recycling	Storage (ISI)				Conveyance (South Delta Improvements)	Watershed Management	Water Quality Control	Operational Strategies, Monitoring, Diversion Management
		Agricultural	Urban	Wetlands		Groundwater & Conjunctive Use	New Surface Storage	Hydropower Reop.	Fish Barrier Assessment				
Goal A: Increase the utility of available water supplies	•	•	•	•	•	•	•	•	•	•	•	•	•
Goal B: Improve access to existing or new water supplies, in an economically efficient manner, for environmental, urban and agricultural beneficial uses	•	•	•	•	•	•	•	•	•	•	•	•	•
Goal C: Improve flexibility of managing water supply and demand to reduce conflicts between beneficial uses, improve access to water supplies, and decrease system vulnerability	•	•	•	•	•	•	•	•	•	•	•	•	•

blank = tool provides negligible or no contribution to meeting objectives
 • = tool provides minor contribution to meeting objectives
 • = tool provides moderate contribution to meeting objectives
 • = tool provides strong contribution to meeting objectives

Implementation of the Water Management Strategy

Given that the CALFED Program will be implemented in stages over 30 years or more, the Water Management Strategy must consider at least two time frames: Stage 1 of the CALFED Program, when not all tools are available to the same degree, and the long term, when more tools can be implemented to provide water management improvements.

The following guidelines for implementation help identify actions for all stages but would be especially useful during Stage 1 of the Program:

- Implement actions with **early** and lasting benefits for water supply reliability.
- Implement actions with **multiple** benefits. These can include multiple benefits for water supply reliability and help meet objectives for other CALFED resource areas.
- Implement actions which are **economical**.
- Use incentives for **local** participation and leverage where possible.
- Institute **operational**, administrative and fiscal actions where possible due to time delay for new facilities.

The long term Water Management Strategy must account for expected changes in environmental, urban, and agricultural water demands over the next 30 years. The foundation of the long term Water Management Strategy will continue to be CALFED's commitment to identify, evaluate, and implement an appropriate mix of all the available water management tools. The components of the Water Management Strategy as it evolves from Stage 1 to the longer term are shown in the following table.

Environmental Water Account (EWA) - The EWA is based on the concept that flexible management of water will achieve fishery and ecosystem benefits more efficiently than a completely prescriptive regulatory approach. The account is dependent on monitoring and real-time diversion management and will be funded each year with dollars, water, and rights to storage and conveyance. These assets will be used to enhance upstream and in-Delta fish protection. For example, the EWA could modify export pumping to avoid times more critical for fish species.

Integrated Storage Investigations (ISI) - The ISI evaluates specific storage opportunities and the relationship between various types of storage and other water management tools. The ISI will provide analyses necessary for CALFED to periodically update and refine the Water Management Strategy throughout the Program implementation. Additionally, these investigations will provide a comprehensive assessment and prioritization of critical fish migration barriers for modification or removal.

Water Management Strategy Implementation Summary		
Tool	Stage 1	Later Stages
Water Transfers	All actions in Water Transfer Program (<i>no quantity targets</i>).	Changes to functioning water market by current state and federal jurisdictional entities (DWR, USBR, SWRCB) or by the legislature.
Agricultural conservation	Actions in Water Use Efficiency Program which are economically feasible locally and statewide.	Additional actions based on economics, market conditions and technical advances.
Urban conservation	Actions in Water Use Efficiency Program which are economically feasible locally and statewide.	Additional actions based on economics, market conditions and technical advances.
Wetlands conservation	Finalize and implement appropriate actions of the Interagency Coordinated Program (ICP) Plan.	Continue to implement appropriate actions from the ICP Plan, modified through adaptive management.
Wastewater recycling	Actions in Water Use Efficiency Program.	Additional actions based on economics, market conditions and technical advances.
Groundwater & conjunctive use	Develop local partnerships through ISI to implement selected projects.	Additional actions based on ISI findings and refinement of WMS.
Hydropower reoperation	Continue evaluation, as needed, through ISI.	Implement based on ISI findings and refinement of WMS.
New surface storage	Pursue implementation of select projects and continue evaluations of other projects through ISI.	Additional actions based on ISI findings and refinement of WMS.
Fish barrier assessment	Identify priorities for modifying barriers through ISI.	Implement in conjunction with the ERP and mitigation of water supply and other impacts.
Conveyance	South Delta Improvements. Study North Delta ecosystem/flood control improvements. Study screened diversion on Sacramento River. Study isolated facility, other water management alternatives to improve drinking water quality.	If appropriate, implement screened diversion on Sacramento River based on study. Present results of study to improve drinking water quality and fishery protection and implement actions.
Watershed management	All actions in Watershed Program (including financial and technical support).	Monitor and adjust actions.
Water quality control	Source control and operational changes. Study operational improvements in ISI. Study other physical improvements and water management options.	Adjust operational guidelines and funding as experience is gained.
Monitoring	Comprehensive monitoring, assessment and research through the CALFED Science Program.	Adjust actions as experience is gained.
Environmental Water Account (EWA)	Provide assets to the EWA (\$50 Million/yr, access to storage and water and ability to flex E/I).	Adjust operational guidelines and funding as experience is gained.

3.6.2 Water Management Strategy Tools: Water Use Efficiency

The CALFED Water Use Efficiency Program (WUE) is one of the cornerstones of CALFED's Water Management Strategy. The CALFED policy toward water use efficiency directs that existing and new water supplies be used efficiently.

The CALFED Water Use Efficiency Program is based on the recognition that implementation of efficiency measures occurs mostly at the local and regional level. The CALFED Water Use Efficiency Program will (1) establish quantifiable objectives, (2) offer support and incentives through expanded programs to provide planning, technical, and financial assistance; (3) monitor progress towards objectives; and, (4) if these objectives are not met, re-evaluate objectives and management options. CALFED agencies will also support institutional arrangements that give local water suppliers an opportunity to demonstrate that cost-effective efficiency measures are being implemented. Some potential water use efficiency benefits, such as water quality improvements, may be regional or statewide rather than local. These are situations in which CALFED planning and cost-share support may be particularly effective.

Potential benefits of the Water Use Efficiency program include:

- Reduces net demand for water
- Reduces fish entrainment as a consequence of reduced pumping or diversion
- Can help in timing of diversions which can reduce entrainment effects on fish
- Could make water available for transfers to water users, the Environmental Water Account, and for environmental flows
- May improve overall Delta and tributary water quality
- Could reduce the total salt load to the San Joaquin Valley

CALFED has committed to implement a robust, incentive-based Water Use Efficiency Program to encourage the efficient use of water in the CALFED solution area. The water use efficiency approach integrates State legal requirements and the practical need for local implementation through a combination of technical assistance, incentives, and directed studies for the four WUE program elements: Agricultural Water Conservation, Urban Water Conservation, Water Recycling, and Managed Wetlands. CALFED actions will build on existing efficiency efforts.

Although details of these elements are currently being refined, implementation is scheduled to begin during 2000. Technical assistance programs and directed studies will begin for all four elements. Incentive programs will begin in late 2000. Incentive programs will be designed to award CALFED grant funding for projects that demonstrate potential to provide CALFED water supply reliability, water quality, or ecosystem restoration benefits.

In many ways, urban water conservation is already a success story. Implementation of water use efficiency measures in Southern California has enabled many areas to hold water use constant while supplying a rapidly growing population. For example, Los Angeles is now using

approximately the same amount of water that it did in 1970, even though its population has increased by 32 percent. CALFED will encourage continuation of the considerable progress already being made in urban water use efficiency. To do so, CALFED will rely substantially on the water use efficiency certification program that is evolving out of the consensus California Urban Water Conservation Council process. This process, which has substantial support from both water agencies and public interest groups, provides for peer review and certification of urban water agency implementation of established Best Management Practices. CALFED will support this urban effort through expanded programs to provide planning, technical, and financial assistance.

In the agricultural sector, CALFED will also rely heavily on the existing Agricultural Water Management Council endorsement process. In developing its program, CALFED organized both an expert review panel and a facilitated stakeholder focus group effort. The review panel and focus group both recommended that CALFED develop regionally-specific strategic plans containing water use efficiency quantifiable objectives. These regional plans are currently being developed, and will include targeted benefits, quantifiable objectives, and regional implementation strategies. CALFED will use the quantifiable objectives and strategic plans in concert with the Agricultural Water Management Council endorsement process to identify and expand planning, technical, and financial programs for water use efficiency in the agricultural sector.

Water use efficiency measures can make available additional water supplies for environmental or consumptive users, and can serve as a useful tool for solving many of the problems in watershed management. Improvements in water use efficiency are anticipated from a wide range of CALFED program elements, and not all of these are reflected in this discussion of the Water Use Efficiency Program. As with other program elements, actions and activities undertaken throughout the CALFED Program can have corollary benefits in other CALFED program areas. For example, CALFED expects to generate substantial water use efficiency incentives through improvements in the water market and through willing-seller water acquisitions for Ecosystem Restoration Program instream flows. In addition, improvements in water quality in the Water Quality Program can assist in meeting water use efficiency goals by reducing the need for water to meet soil leaching requirements and by enhancing water reclamation opportunities. Similarly, actions taken under the Water Use Efficiency Program are expected to have ancillary benefits for other CALFED objectives. Reducing unnecessary surface runoff from farms and urban areas can enhance water quality by reducing the discharge of unwanted substances into watercourses. In addition, WUE measures can improve water supply reliability by increasing the number of opportunities available to water managers. Finally, through the planning and implementation of WUE measures, the cost effectiveness of various storage components will become better defined.

Based on analysis provided in the *Water Use Efficiency Program Plan*, estimates of potential reduction of water application and irrecoverable losses are summarized in the following table. Values in the table represent potential reductions of water application and irrecoverable losses that are most likely to occur for future conditions regardless of the outcome of a CALFED

solution (termed no-action) as well as the potential incremental savings from a CALFED solution. Representative values shown in this summary table are all midpoints in value ranges contained in the *Water Use Efficiency Program Plan*.

The purpose of this table is to give a perspective of the order of magnitude of the potential effects of water use efficiency improvements both with and without the CALFED solution. The values presented are not goals or targets. Rather, they are intended to provide the relative magnitude of potential results of efficiency actions. Actual savings will depend on the magnitude of state, federal and local investment in water use efficiency measures. Stakeholders disagree on the magnitude and/or the feasibility of achieving these values. Stakeholders do agree, however, that water conservation can provide significant benefits for multiple purposes and therefore is a significant contribution to the CALFED solution. Consistent with a programmatic analysis, specific actions or programs that would have to be implemented to achieve these results have not been specified.

The table describes three types of potential reductions:

- Recovered Losses with Potential for Rerouting Flows - These losses currently return to the water system, either as groundwater recharge, river accretion, or direct reuse. Reduction in these losses would not increase the overall volume of water, but might have other benefits such as making water available for irrigation or instream flows during dry periods, improving water quality, reducing energy used for groundwater pumping, decreasing diversion impacts or improving flow between the point of diversion and the point of reentry.
- Potential Irrecoverable Losses - These losses currently flow to a salt sink, deep aquifer, or the atmosphere, and are unavailable for reuse. Reduction in these losses would increase the volume of useable water.
- Potential Reduction of Application - This is the sum of the previous reductions.

	No Action Alternative ¹ (in absence of CALFED)			Potential CALFED Increment			Total Conservation Potential		
	Recovered Losses with Potential for Rerouting Flows (A=C-B) ³	Potential for Recovering Currently Irrecoverable Losses (B) ³	Total Potential Reduction of Application (C) ³	Recovered Losses with Potential for Rerouting Flows (A=C-B) ³	Potential for Recovering Currently Irrecoverable Losses (B) ³	Total Potential Reduction of Application (C) ³	Recovered Losses with Potential for Rerouting Flows (A=C-B) ³	Potential for Recovering Currently Irrecoverable Losses (B) ³	Total Potential Reduction of Application (C) ³
Urban (total delivered water: 12.0 MAF)	397	530	927	355	680	1035	752	1210	1962
Agricultural (total applied water: 31.5 MAF)	2235	220	2455	1676	165	1841	3911	385	4296
Urban recycling ²	55	455	510	188	567	755	243	1022	1265
Total	2687	1205	3892	2219	1412	3631	4906	2617	7523

¹ All figures are in thousand acre-feet and represent forecasts for year 2020. This table comes CALFED's Water Use Efficiency Program Plan

² No Action urban recycling values do not include existing recycling levels of 485,000 acre-feet (the March 1998 *Phase II Interim Report* inadvertently included the existing values).

³ The values in Column B (Potential for Recovering Irrecoverable Losses) and Column C (Total Potential Reduction of Application) were computed explicitly from regional values of applied water, depletion, evapotranspiration of applied water, and other factors. The values in Column A (Recovered Losses with Potential for Rerouting Flows) were computed as the difference between values in Columns B and C.

The Water Use Efficiency Program includes water conservation and water recycling actions to facilitate efficient use of water at the regional and local level. The programmatic WUE actions include the following:

Water conservation related actions include:

- Work with the California Urban Water Conservation Council and the Agricultural Water Management Council to identify appropriate urban and agricultural water conservation measures, set appropriate levels of effort, and, in the case of the urban effort, to identify a proper entity and process to certify or endorse water suppliers that are implementing cost-effective feasible measures.
- Expand state and federal programs to provide sharply increased levels of planning, technical, and financing assistance and develop new ways of providing assistance in the most effective manner.

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- Help urban water suppliers comply with the Urban Water Management Planning Act.
 - Help water suppliers and water users identify and implement water management measures that can yield multiple benefits including improved water quality and reduced ecosystem impacts.
 - Identify and implement practices to improve water management on managed wetlands.
 - Gather better information on water use, identify opportunities to improve water use efficiency, and measure the effectiveness of conservation practices.
 - Develop, in consultation with the Agricultural Water Management Council, a program of technical and financial incentives to achieve local-level implementation of water use efficiency measures in the agricultural sector. The financial incentives should generally take the form of loans for actions that have been identified as cost-effective for the district in a water management plan approved by the Agricultural Water Management Council. The financial incentives should generally take the form of incentive grants for water use efficiency measures that are supplemental to measures that are cost-effective at the district level.
 - Identify, in region-specific Strategic Plans for Agricultural Areas, quantifiable objectives to assure improvements in water management. Quantifiable objectives are objectives for improvements in water management which can be measured or otherwise tracked to assure that such improvements occur. Objectives will include outcome indicators based on actual water use. Objectives must be related to specific CALFED objectives and are expected to vary by region.

Water recycling actions include:

- Help local and regional agencies comply with the water recycling provisions in the Urban Water Management Planning Act.
- Expand state and federal recycling programs in order to provide sharply increased levels of planning, technical, and financing assistance (both loans and grants), and develop new ways of providing assistance in the most effective manner.
- Provide regional planning assistance that can increase opportunities for use of recycled water.

As part of its Water Use Efficiency Program, CALFED will propose, after consultation with CALFED agencies, the Legislature, and stakeholders, State legislation that requires appropriate measurement or metering of water use for all water users in the State of California. In developing this legislation, important technical and stakeholder issues will be addressed to define "appropriate measurement," which is expected to vary by region. Aspects of this definition include the nature of regional differences, appropriate point of measurement, and feasible level of precision.

Assurances will play a critical role in the Water Use Efficiency Program element. The assurance mechanisms are structured to ensure that urban and agricultural water users implement the appropriate efficiency measures. Certain CALFED activities (such as participating as a buyer in a water transfer, receiving water from a drought water bank, or receiving water made available solely because of supply enhancements such as new, expanded, or reoperated facilities) will require water suppliers to show that they are in compliance with the applicable urban or agricultural council agreements and applicable State law. This requirement will result in careful analysis and effective implementation of cost-effective conservation measures identified in those agreements.

A high level of water use efficiency will also be required as a condition for permitting of any new surface storage projects that include water supply reliability as a project purpose. Widespread demonstration of efficient use by local water suppliers and irrigation districts will be a prerequisite to CALFED implementation of such new storage projects. Regulatory requirements and some proposed compliance strategies are described more fully in Chapter 5.

CALFED will facilitate adoption of water use efficiency measures by providing a high level of technical support and financial incentives. Adequate funding for assistance programs will be an important assurance for local agencies. During the first four years of Stage 1, CALFED proposes State and Federal government investment of \$500 million (1/2 state and 1/2 federal), with an additional \$500 million coming from local matching funds. At the end of the first four years of Stage 1, CALFED will prepare a more comprehensive evaluation of program implementation. At that time, it may increase or reduce the targeted conservation goals to reflect actual implementation experience, redirect investments to achieve the most effective water use efficiency results, and/or introduce new programs as necessary and appropriate.

More information on the Water Use Efficiency Program is contained in the revised *Water Use Efficiency Program Plan*, which is included as another appendix to this *Final Programmatic EIS/EIR*.

3.6.3 Water Management Strategy Tools: Water Transfers

The transfer of water between willing sellers and buyers represents an economically and environmentally sound part of the State's water strategy. Voluntary water transfers provide an important water resource management tool by fostering efficient allocation of water resources throughout the state. The successful implementation of CALFED is dependent upon access to California's major water transportation systems and removing other barriers to transfers: physical, institutional and legal. Therefore, the goal of the CALFED Water Transfers Program is to encourage the development of a more effective water transfer market that facilitates water transfers and streamlines the approval process while protecting water rights, environmental conditions, and local economic interests.

Every year, hundreds of thousands of acre-feet of water are transferred between willing parties. Most of these transfers consist of in-basin exchanges or sales of water among Central Valley Project (CVP) or State Water Project (SWP) contractors. For example, in 1997 nearly 288,000 acre-feet of CVP water was transferred by CVP contractors south of the Delta. Since 1993, nearly 1.6 million acre-feet of CVP water has been transferred north and south of the Delta by contractors within the various divisions of the CVP. In addition, approximately 230,000 acre-feet of non-CVP water has been purchased and transferred by the CVP Interim Water Acquisition Program to meet instream flow objectives. In addition to internal CVP or SWP transfers which do not require approval by the State Water Resource Control Board (SWRCB), the SWRCB has reviewed and approved over 1.7 million acre-feet of short-term water transfer proposals throughout the state since 1990.

Generally, past transfers have been successful, and CALFED does not intend to interfere with the historical ability to transfer water. However, some transfers have caused concerns regarding adverse impacts to other water users, to rural community economies and to the environment. They have also highlighted contradictory interpretations of state law, the lack of reliable ways to transport the transferred water across the Delta, and complicated approval processes. Before the value of water transfers as a water management tool can be fully realized, these problems need to be addressed.

Water Transfer Issues

Over the course of the last few years, CALFED work groups have identified a number of issues which constrain the water transfer market. These were sorted into three broad categories to aid in developing resolution:

1. *Environmental, socio-economic, and water resource protection issues* - including:
 - Third party socio-economic impacts
 - Groundwater resource protection
 - Environmental protection in source areas
 - In-Stream Flow (Section 1707) Transfers

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- Rules/guidelines for tracking environmental water transfers
2. *Technical, operational, and administrative rules* - including:
 - Transferrable water and application of the "no injury rule"
 - Operations criteria and carriage water requirements
 - Reservoir refill criteria
 - Streamlining the transfer approval process
 3. *Wheeling and access to state/federal facilities (especially for cross-Delta transfers)* - including:
 - Predictability of access for transferring water in state and federal project facilities
 - Wheeling costs

Action Plan

The *Water Transfer Program Plan* describes a strategic plan of actions, policies and processes. CALFED member agencies (USBR, DWR, and SWRCB) have legal and regulatory responsibility for review and approval of most water transfers and also have jurisdiction over many of the storage and conveyance facilities required to make water transfers work. These agencies are in a position to improve or facilitate the operations of the water market by adopting policies and implementing programs that will allow transfers to be completed efficiently while still providing necessary protection from unreasonable adverse impacts on the environment or other third parties. The strategic plan provides direction and prioritization for implementation of CALFED's Water Transfer Program, and includes the following actions:

1. Interactive California Water Market Information Web Site

- a. **In order to coordinate all of the actions that follow, CALFED agencies will develop the On Tap on-line water market information source for California water transfers.** On Tap will coordinate agency policies and procedures, clarified and defined through other actions described below, into an interactive source for:
 - Database of historic transactions and those pending agency approval;
 - Software program to assist proponents with preparing applications;
 - Public forum for interested stakeholders to discuss policies and procedures governing water transfers;
 - Related tools, links, research, and information.

2. Environmental, Socio-economic, and Water Resource Protection

- a. **CALFED will recommend establishment of a California Water Transfers Information Clearinghouse** to ensure that decisions regarding proposed water transfers can be made with all parties in possession of complete and accurate information and to facilitate assessment of potential third party impacts. CALFED believes that improvements in the clarity and understanding of rules and procedures, the timely public disclosure of information on proposed transfers, and the availability of data and research can help ensure that the water market promotes responsible transactions. The Clearinghouse would not function as a regulator, a market broker, or as a water bank. The Clearinghouse would facilitate or perform the following functions:

- Manage operations of On Tap, the on-line information source (see previous action);
- Maintain database of relevant market information;
- Ensure inter-agency coordination;
- Facilitate research and assist with developing useful tools and information;
- Disseminate information on groundwater, cumulative, and local socioeconomic impacts of specific transfers as provided by applicants;
- Report Information Clearinghouse activities to the public and to agencies.

- b. **CALFED agencies will require additional water transfer analysis regarding impacts, under their existing authorities.** To the extent permitted under existing law, DWR, USBR, and SWRCB will require transfer proponents to provide analysis of the impacts of a proposed transfer in three areas (dependent on the characteristics of the proposal), in addition to CEQA or other required environmental analysis:

- Local groundwater impacts;
- Cumulative impacts; and
- Third-party socioeconomic impacts

This analysis will be for information and disclosure purposes only and would be used as the basis to approve, condition or deny a transfer only as otherwise permissible under current rules and procedures. Information would be provided by the transfer proponents and disclosed through the California Water Transfers Information Clearinghouse.

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- c. **CALFED agencies will develop improved tracking protocols to ensure that water transferred to an instream flow can be and then is delivered to the intended destination.** Objectives of this effort include:

- Develop an accounting mechanism to be used to test prospective transfers and to verify actual transfers.
- Assess the need for additional measures beyond California Water Code Section 1707 to protect water transferred to instream flow.
- Develop an agreed upon level of precision to provide assurance to the necessary parties that the transferred quantity was delivered.
- Determine needed communication lines between transferring party and tracking entity to ensure a smooth flow of information.
- Included an adaptive process that allows for periodic refinements in accounting mechanisms and communication lines, if necessary, as experience dictates.
- Provide mechanisms for assuring that water transferred for instream use is supplementary to water used to meet regulatory requirements, unless otherwise explicitly provided by the terms of the transfer.
- Clarify the circumstances under which water transferred for instream use may be subsequently diverted for other purposes downstream.

- d. **CALFED agencies will work with stakeholders and the Legislature to assist local agencies in development of groundwater management programs to protect groundwater basins in water transfer source areas.** As part of the Water Management Strategy, a groundwater assistance program (discussed more explicitly under *Storage* tools) will be established to fund studies to gather groundwater data and to enable local entities to develop and implement local groundwater management/monitoring programs. These studies will be used to help evaluate an area's potential for implementing conjunctive use projects designed to help meet CALFED objectives. The groundwater management programs will help ensure that conjunctive use projects will protect the local groundwater resources and correlative rights.

3. **Technical, Operational, and Administrative Rules**

- a. **CALFED agencies will streamline the current water transfer approval processes through development of new tools, clarification of existing policies, refinement of processes and addition of staff and resources.** CALFED proposes to develop streamlined transfer approval procedures for certain kinds of transactions (intra-regional transfers, short-term transfers, dry-year transfers). This streamlining would include "pre-certification" of certain classes of transfers and

expedited environmental review procedures and may necessitate legislation to implement various aspects. Results of these improvements will be disclosed through the web site described in Action 1 above. Actions include:

- convene a panel of stakeholders to draft recommendations for a streamlined transfer approval process;
- support development of legislation as deemed necessary.

In addition, the SWRCB has produced a guidebook which describes some of the existing procedures, rules, and criteria used by the SWRCB, DWR, and USBR during the review and approval of water transfers. (The guidebook can be viewed at www.waterrights.ca.gov).

- b. **CALFED agencies will work with stakeholder representatives to clarify and define what water is deemed transferrable under what conditions.** The objective of this process will be to develop a standardized set of rules for defining transferable water, including variations in the accepted criteria for time or location (i.e., one-year transfers versus multi-year and intra-basin versus inter-basin). The On Tap web site being developed will explain the agencies' policies and will identify areas of technical agreement. This proposed process will also address areas of disagreement between agencies and stakeholders. This should result in a set of water transfer scenarios and applicable definitions. This effort may include adoption of water rights orders or formal rules by the SWRCB during the initial years of CALFED's Stage 1 implementation. It may also require the development of legislation.
- c. **CALFED agencies will work with stakeholder representatives to resolve conflicts over carriage water criteria.** (For this purpose, carriage water is defined as the additional water that may be necessary to accompany a cross-Delta water transfer to maintain water quality or other standards imposed on Delta export operations.) CALFED will facilitate a technical review by CALFED agencies and key stakeholders to help answer the following questions: (1) When is a carriage water requirement properly imposed on a cross-Delta water transfer? (2) When carriage water is required, what is the best method for calculating or quantifying the amount of carriage water? Clarification of this requirement is necessary so that proponents can adequately evaluate and account for the potential impacts from a carriage water requirement while they are still negotiating their transfer arrangement. This will result in a better understanding of risk potential and assignments of responsibility between seller, buyer, and other parties. In addition, CALFED will facilitate discussions as necessary to implement outcomes of the State Water Resources Control Board's Phase 8 of the Bay-Delta Hearings.

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- d. **CALFED agencies will work with stakeholder representatives to develop criteria that protect other legal users of water from injury as a result of refill of a reservoir after the transfer of stored water.** Objectives of this effort include:

- Articulate a basis for why refill criteria is necessary.
- Develop criteria that are consistent and understandable by transfer proponents.
- Define when refill criteria is applicable.
- Define how the quantity of refill is calculated.
- Focus on minimizing impacts to CVP and SWP water operations.

Similar to carriage water requirements, standardizing refill requirements will allow proponents to adequately evaluate and include the effects of reservoir refill requirements while they are still negotiating their stored water transfer arrangement. This will allow for better understanding of risk potential and assignments of responsibility for mitigating any affects to CVP or SWP water supplies.

4. **Wheeling and Access to State/Federal Facilities**

- a. **CALFED agencies will improve forecasting tools and more widely disclose potential pumping and conveyance capacity in project facilities,** including limiting factors and inherent risks. The intent is to provide transfer proponents with forecasts regarding the potential availability of conveyance capacity for cross-Delta water transfers and the probabilities of its availability. Forecasts also could be provided for other portions of project conveyance facilities, as needed. Forecasts would occur on a monthly basis (in conjunction with water supply forecasts) and would be based on the best information available to project operators.

A forecast would not guarantee that the capacity will be available because of the variability of operating criteria. These include but are not limited to: hydrologic conditions, ESA requirements, Delta water quality standards, discretionary actions, and physical capacity limitations. Forecasts would be developed in conjunction with, or as part of, the deliberations of the CALFED Operations Group (a forum for inter-agency discussion and decision making regarding state and federal water project operations), and would be disclosed through the On Tap web site.

- b. **CALFED agencies will work with stakeholder representatives to consider modification of policies and procedures for transporting non-project water through existing project water conveyance facilities.** Such policies and

procedures include how to determine priorities, how to process requests, and how to calculate unused capacity. CALFED will initially work with DWR and USBR to identify potential policy modifications. Stakeholder discussions will begin after an initial set of options and assessments of each option is developed. Recommended solutions may require development of legislation. CALFED will support the development of any legislation as needed.

- c. **CALFED agencies will work with stakeholder representatives to develop cost criteria associated with transporting transferred water through state or federal conveyance facilities.** This issue is currently the subject of draft legislation which is being negotiated outside the CALFED process. If legislation is enacted which establishes new rules for cost allocations associated with wheeling transferred water, the new rules will be incorporated into the applicable agencies' procedures. If the legislative effort does not resolve this issue, CALFED may facilitate further discussion among CALFED agencies and stakeholders in an effort to agree upon a set of criteria governing the determination of transport costs such that transfer proponents can factor such costs into proposals early in the development phase of a potential water transfer. These efforts may result in the development of legislation. CALFED will support such development activities as needed.

More detailed information on the issues and these recommended actions is included in the *Water Transfer Program Plan*, another appendix to this *Programmatic EIS/EIR*.

3.6.4 Water Management Strategy Tools: Conveyance

The Delta water conveyance component of CALFED's Water Management Strategy has been the focus of sustained and substantial public interest. In fact, this component has served as the primary variable program component in the CALFED alternatives analysis. As such, conveyance options have undergone considerable review and refinement in the Program.

Developing Conveyance Alternatives

At the beginning of Phase II of the CALFED Bay-Delta Program, seventeen alternative variations were developed around the three broad alternatives (existing system conveyance, modified through-Delta conveyance, and dual Delta conveyance) resulting from the Phase I work. Five alternative variations were eliminated due to technical problems or to reduce duplication where two or more alternatives achieved the same Delta conveyance function. The remaining twelve alternative variations were described in the *Project Alternatives Technical Appendix* to the March 1998 *Draft Programmatic EIS/EIR*.

To help the comparison of alternatives, the twelve alternative variations were grouped into three broad categories:

Alternative 1 - Includes program elements for ecosystem restoration, water quality, levee and channel integrity, water use efficiency, water transfers, and watershed management. In addition, Alternative 1 proposes the use of existing Delta channels, with some modifications, and various storage options.

Alternative 2 - Includes program elements for ecosystem restoration, water quality, levee and channel integrity, water use efficiency, water transfers, and watershed management. In addition, Alternative 2 proposes significant modifications of interior Delta channels to increase water conveyance across the Delta, combined with various storage options.

Alternative 3 - Includes program elements for ecosystem restoration, water quality, levee and channel integrity, water use efficiency, water transfers, and watershed management. In addition, Alternative 3 includes Delta channel modifications coupled with a conveyance channel that takes water around the Delta, combined with various storage options.

Distinguishing Characteristics

Looking simultaneously at all the information on how well the alternatives meet the objectives and how well they satisfy the solution principles would be nearly impossible due to the large amount of information. Furthermore, many aspects of the alternatives do not vary from one alternative to another. They all include program elements that make significant progress toward meeting program objectives and reducing conflict in the system.

On the other hand, there are aspects that do differ among the alternatives and it is these aspects, or distinguishing characteristics, that guided the evaluation. These characteristics are important when assessing the performance, impacts and overall merits of each alternative. Following are the eighteen identified distinguishing characteristics:

- **In-Delta Water Quality** - provides a measure of **salinity** and **flow circulation** for four areas of the Delta. The measure focuses on water quality for in-Delta agricultural uses.
- **Export Water Quality** - provides a measure of **salinity**, **bromide**, and **total organic carbon** for four export diversion locations from the Delta. The measure focuses on municipal/industrial uses for the North Bay Aqueduct and Contra Costa Intake and for agricultural and municipal/industrial uses for the SWP and CVP export pumps in the south Delta.

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- **Diversion Effects on Fisheries** - intended to include only the **direct effects on fisheries due to the export diversion intake and associated fish facilities**. These will vary depending on diversion location, size, type, method of handling bypassed fish, and annual volume of water diverted. The effects on flow patterns in the Delta as a result of the diversion are addressed in the distinguishing characteristic for "Delta Flow Circulation". The loss of fish due to diversion to another route is covered in this effect.
 - **Delta Flow Circulation** - is intended to include the **direct and indirect effects of water flow circulation on fisheries due to the export diversions and changes in cross-Delta water conveyance facilities**. These will vary depending on diversion location, size, type, and operation of conveyance facilities, and annual volume of water diverted.
 - **Storage and Release of Water** - provides a measure of the environmental benefit or adverse effects of storing water in new Program storage facilities and releasing that water at a later time of need. Storing the water will generally result in some degradation of environmental conditions while releasing that water, for whatever use, will generally result in some environmental benefits.
 - **Water Supply Opportunities** - is a measure of the change provided by the alternatives for water supply for the environment and for agricultural and urban uses.
 - **Water Transfer Opportunities** - is an estimate of how well each alternative can carry water that may be generated through market sales or trades at different locations in the system. This estimate assumes that a certain amount of conveyance capacity has already been allocated for state and federal project water.
 - **Operational Flexibility** - provides an indication of how well each alternative can shift operations as needed from time to time to provide the greatest benefits to the ecosystem, water quality, and water supply reliability.
 - **South Delta Access to Water** - is a measure of how the alternatives affect local beneficial use of water in the vicinity of the state and federal Delta export facilities due to changes in water levels and water quality in the channels.
 - **Risk to Export Water Supplies** - is intended to provide a measure of which alternatives best reduce the risk to local and export water supplies from a catastrophic earthquake.
 - **Total Cost** - will include the initial capital costs for the Program as well as annual costs. Initial costs will include study, design, permitting, construction, mitigation,

acquisition, and other first costs of the Program. Annual costs will include operation and maintenance, monitoring, recurring annual purchases, and other annual costs.

- **Assurances Difficulty** - is an estimate on how difficult it will be to formulate an assurance package and get consensus among agencies and stakeholders. It is not an assessment on the perceived effectiveness of the assurance package.
- **Habitat Impacts** - is an assessment of the adverse habitat impacts due to implementation of the CALFED actions.
- **Land Use Changes** - is primarily a measure of the amount of agricultural land that would change to other uses by implementation of the Program.
- **Socio-Economic Impacts** - include adverse and beneficial impacts on commercial and recreational fishing, farm workers, power production, and others indirectly affected by Program actions.
- **Consistency with Solution Principles** - provides a qualitative measure of how well the alternatives meet the Program solution principles. Alternatives which violate the solution principles are not likely to be practicable or implementable. The solution principles provide insight in considering tradeoffs among the other distinguishing characteristics in a balanced manner.
- **Ability to Phase (Stage) Facilities** - provides an indication on how easy it will be to stage implementation of storage and conveyance facilities over time.
- **Brackish Water Habitat** - In the Bay-Delta system there is a salinity gradient between fresh and salt water. The western Delta is an area of important aquatic habitat with salinity levels of approximately 2 parts per thousand. The location of this salt concentration, known as X2, is an indicator of effects on this critical brackish water habitat among the alternatives.

Evaluation of Conveyance Alternatives

The March 1998 *Phase II Interim Report* provided a summary of preliminary analyses with these eighteen distinguishing characteristics. In these analyses, two key distinguishing characteristics were particularly important in identifying how well the alternatives perform. **Export Water Quality** and **Diversion Effects on Fisheries** are highly dependent on the alternative selected. Therefore, irrespective of whether these two characteristics are the most important to selection of the Preferred Program Alternative, they are the characteristics most dependent on that decision.

Based on the assumptions made for evaluations in the March 1998 *Phase II Interim Report*, the dual Delta conveyance with an isolated facility appeared to provide greater technical performance than the other alternatives. At the same time, however, there are still major assurances issues associated with this approach, and CALFED needs to obtain better scientific information plus information on an array of other water management options to assess the need for the dual Delta conveyance. In addition, while the dual Delta conveyance may have technical advantages over other Delta conveyance, it would likely take a decade or more to plan, design, permit, and construct.

To address the assurances, need for better scientific information, and long lead time required for the dual Delta conveyance, CALFED more fully integrated adaptive management throughout the program elements. This led to structuring implementation in stages over time. Each stage begins implementation of certain actions, gathers scientific information to help future decisions on other actions, and provides greater assurances that actions within each stage will move forward together and will be operated as intended. With this approach, a more informed decision on the need for the dual Delta conveyance can be made in the future.

The CALFED strategy regarding conveyance must consider fisheries and water quality for in-Delta uses and drinking water. These factors are critical to conveyance decisions both now and in the future as part of adaptive management. The existing Delta channels will be an integral part of CALFED's strategy for Delta conveyance. The reliance on these channels provides a shared interest in restoring, maintaining, and protecting Delta resources, including water supplies, water quality, levees, channel capacities, natural habitat, and the common Delta Pool, which also protects in-Delta agricultural uses. Some modifications to these through-Delta channels can improve all of these Delta resources.

Because of the many complex interactions within the Bay-Delta system, successfully implementing a through-Delta strategy requires careful balancing of actions to address a wide range of concerns, including water quality, flood control, fisheries, water levels, circulation patterns, channel scour and sediment deposition. Actions which improve water quality and flow direction in one region of concern, for example, may in turn create adverse impacts elsewhere. The understanding of these complex hydrodynamic, biological, and chemical interactions is still incomplete so it will be necessary to approach the optimization of CALFED's strategy with a high degree of cooperation, rigorous monitoring, scientific analysis, and an open-minded approach to solution options. It will also be essential that the implementation of proposed solution actions be linked so that the appropriate balance of benefits and impacts is maintained throughout the implementation period.

CALFED's Delta Conveyance Strategy

CALFED's strategy is to develop a through-Delta conveyance alternative based on the existing Delta configuration with some modifications, evaluate its effectiveness, and add additional

conveyance and/or other water management actions if necessary to achieve CALFED goals and objectives. The initial through-Delta conveyance will be continually monitored, analyzed, and improved to maximize the potential of the through-Delta approach to meet CALFED goals and objectives, consistent with the CALFED Solution Principles. If the through-Delta conveyance fails to meet the CALFED goals and objectives, there will be a reassessment of the reasons and the need for additional Delta conveyance and/or water management actions.

As noted above, CALFED has identified two factors, export water quality and diversion effects on fisheries, as especially important for evaluating the effectiveness of the CALFED conveyance alternative. These and other factors will be continually reevaluated during Stage 1 as part of the adaptive management process. Under the Preferred Program Alternative, some additional actions may be taken to enhance the through-Delta alternative. For example, proceeding with a screened diversion facility on the Sacramento River is a potential additional action that could proceed after project-level environmental documentation, feasibility studies, and successful resolution of project-specific fishery impact issues. Other actions to enhance the CALFED conveyance strategy, such that CALFED goals and objectives could be achieved, would require consideration of a variety of alternatives and evaluation of available new information. This evaluation would take place in a supplemental programmatic evaluation focused on the goals and objectives that have not been achieved in addition to project-level evaluations. For example, if ongoing evaluation indicates that CALFED is not achieving its goals and objectives using the through-Delta alternative, supplemental programmatic evaluation of a number of water management options, including an isolated conveyance facility, would be conducted and a decision made based on this evaluation.

As noted above, CALFED recognizes the need to develop solutions to the conveyance issues that provide appropriate balance in meeting all of CALFED's goals and objectives. CALFED believes that benefits to water quality and water supply reliability gained by conveyance improvements in Stage 1 and beyond must be shared between both consumptive and environmental water uses. Defining how the benefits are shared for particular projects will be determined during the implementation process.

Details of the initial Delta conveyance improvements will be determined after comprehensive, project-level environmental analyses and technical studies are completed, but they are expected to include the following actions and considerations:

In the south Delta region—

Some of the actions listed below are components of the "South Delta Improvement Program" which has been under study and development for a number of years. The list also includes other actions to improve ecosystem function, water quality, and water supply reliability. These components will go forward following the completion of project-specific environmental documents.

The specific elements included in the recommended approach are:

- Implement regional Ecosystem Restoration Program goals (specific actions for early implementation need to be identified).
- Consolidate and screen local agricultural diversions based on an appropriate priority and initiate a screen maintenance program.
- Develop a strategy to resolve regional water quality problems including actions to improve San Joaquin River dissolved oxygen conditions and San Joaquin River drainage as described in the CALFED Water Quality Program. Evaluate the feasibility of recirculation of water pumped from the Delta by the CVP and SWP. If feasible, and consistent with CALFED ecosystem restoration goals and objectives, implement a pilot program.
- Implement the Vernalis Adaptive Management Plan. Include development of a long-term plan describing actions of the San Joaquin River Group Authority to improve water management practices.
- Construct a 500 cfs test facility at the Tracy Pumping Plant to develop best available fish screening and salvage technology for the intakes to the SWP and CVP export facilities.
- Construct a new screened intake for Clifton Court Forebay for the full export capacity of the SWP.
- Implement Joint Point of Diversion for the SWP and CVP.
- Evaluate and decide on whether to retain a separate CVP intake facility or to consolidate with the SWP facility. An intertie between Clifton Court Forebay and the Tracy Pumping Plant will be required if the export location is consolidated at Clifton Court and will be evaluated if exports continue at both locations. Also evaluate and potentially implement an intertie between the projects downstream of the export pumps.
- Obtain permits to use full SWP capacity of 10,300 cfs for operational flexibility, consistent with all applicable operational constraints, for water supply and environmental benefits. Facilitate interim SWP export flexibility up to 8500 cfs, with appropriate constraints.
- Increase SWP pumping by 500 cfs from July through September.

-
- Install operable barriers to ensure water of adequate quantity and quality for beneficial uses within the South Delta. Barrier alternatives include installation of an operable Grant Line Canal barrier, which would be constructed and operated in accordance with conditions and directions specified by the U.S. Fish and Wildlife Service, the California Department of Fish and Game and the National Marine Fisheries Service. In the interim prior to installation of permanent operable barriers, DWR would continue to install temporary barriers on an annual basis.
 - Extend and screen agricultural intakes as required to assure local water supply availability.
 - Monitor barrier effects on fish, stages, circulation, and water quality.
 - Implement mitigation actions for direct and indirect project features and actions.
 - In coordination with regional ERP actions, improve flood control through levee improvements, levee setbacks, channel dredging, and flood plain restoration.

In the north Delta region--

- Develop operational criteria and initiate operational studies (such as more intense fish monitoring on both sides of the Cross Channel, opening and closing the gates on tidal cycles, etc.) for the Delta Cross Channel that balances flood control, water quality, water supply reliability, and fisheries concerns.
- Study and evaluate a screened diversion structure on the Sacramento River of up to 4,000 cfs. This evaluation would consider how to operate the Delta Cross Channel in conjunction with this new diversion structure to improve drinking water quality, while maintaining fish recovery. If the evaluation demonstrates that the diversion facility is needed to improve water quality in the Delta and at the export facilities, and can be constructed and operated without adverse effects to anadromous and estuarine fish, construction will begin late in Stage 1. This facility would likely include a fish screen, pumps and a channel between the Sacramento and Mokelumne Rivers. The design, size and operating rules for this facility would allow for analyses of impacts to upstream and downstream migrating fish as well as impacts from habitat shifts resulting from increased flows in the eastern Delta on Delta species.
- Construct new setback levees, dredge and/or improve existing levees along the channels of the lower Mokelumne River system from Interstate 5 downstream to the San Joaquin River to improve conveyance and resolve flood concerns in this region. These actions would be carefully coordinated with ecosystem restoration

actions to create additional tidal wetlands and riparian habitat to assure that a balanced solution to local and regional concerns would be achieved.

Throughout the Delta region--

- Conduct localized channel dredging as needed to restore and maintain sufficient channel capacities to support balanced beneficial uses, including flood control, navigation, recreation, fisheries, water quality, water levels, and circulation.

Future Conveyance Actions

CALFED will evaluate progress towards achieving its water quality and species recovery goals and objectives during Stage 1 with the advice and assistance of expert panels as described in the Water Quality and Ecosystem Restoration sections of this report. The deliberations of those panels will be part of the open, public decision making process CALFED will follow to determine if different conveyance and/or other water management actions should be evaluated in order to achieve water quality and species recovery goals and objectives.

CALFED will use the advice of water quality expert panels, the Delta Drinking Water Council, and the ERP Science Review Panel to conduct program reviews in 2003 and 2007 with stakeholder involvement to assess whether Stage 1 actions to meet CALFED goals and objectives have been successful and determine whether modifications in conveyance and/or additional water management actions should be evaluated to simultaneously achieve species recovery, water quality improvement, levee system integrity, and water supply reliability. CALFED will present the results of these reviews to the Legislature and Congress, along with its recommendations, if any, for legislative action.

In the event of a finding that a through-Delta conveyance system is inadequate to achieve CALFED goals and objectives, additional actions, including an isolated facility, source water blending or substitution, and other actions will be intensively evaluated through supplemental programmatic analysis for their ability to solve these problems, and a decision made to proceed with the most appropriate actions. If an isolated facility were ultimately found to be necessary for achieving CALFED's goals and objectives, it would be designed with each of the following assurances:

1. An agreement limiting the amount, or proportion, of water that can be exported (linked to water year types and flexible enough to allow additional exports when conditions allow) and needed assurances for compliance
2. Commitment to continuous improvement of in-Delta water quality sufficient to protect existing beneficial uses (Delta standards or contracts including assurances for implementation, permits, financing, and Operations and Maintenance)

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3. Commitment to avoid potential seepage and flood impacts of an isolated facility along its alignment
 4. Long-term funding for Delta levees (perhaps tied to quantity of water moved in the isolated facility or other institutional assurances) and commitment to provide at cost, suitable excess excavated material from facility construction for levee and habitat improvements
 5. Reaffirm commitment to protect all area of origin water rights and to continue implementation of the 1959 Delta Protection Act
 6. Completion of all environmental documentation and permitting requirements
 7. Demonstrated commitment to finance by beneficiaries
 8. Agreement on operating authority and operating criteria
 9. A determination that the through-Delta conveyance with the other program elements cannot meet CALFED goals and objectives, and that an isolated conveyance facility is the most cost-effective and least environmentally damaging measure to correct this deficiency in meeting the goals and objectives
 10. A decision to proceed with implementation of the Program will come through State and potentially federal legislative action. CALFED intends that this legislative action will not include legislative overrides or exemptions from State or federal environmental laws (including, but not limited to, the federal and State ESA, the Clean Water Act, NEPA or CEQA).

3.6.5 Water Management Strategy Tools: Storage

Integrated Storage Investigation

As part of its ongoing evaluation of the appropriate role of storage alternatives in the CALFED solution, CALFED has initiated the Integrated Storage Investigation. The ISI will coordinate existing storage investigations by individual CALFED agencies, CALFED-initiated storage evaluations and broader water management strategies and analysis to provide a comprehensive assessment of alternative storage options and their utility to overall water management.

Storage of water in surface reservoirs or groundwater basins can provide opportunities to improve the timing and availability of water for all uses. The benefits and impacts of surface and groundwater storage vary depending on the location, size, operational policies, and linkage to other program elements. By storing during times of high flow and low environmental impact,

more water is available for release for environmental, consumptive, and water quality purposes during dry periods when conflicts over water supplies are critical. Storage which is properly managed and integrated with other water management tools can achieve significant improvements for a number of CALFED's water management objectives: reduce conflicts, decrease drought impacts on all beneficial uses, increase supply availability, increase operational flexibility, and improve water quality.

The particular attributes of storage in CALFED's Water Management Strategy vary by the type and location of storage. Water storage located upstream of the Delta functions differently than storage located south of the Delta in the export area. Generally, groundwater projects have more benign on-site environmental and land use impacts than surface storage. Surface storage is more suited to rapidly discharging or receiving large volumes of water, an advantage in real-time management of high river flow periods or environmental storage releases. Offstream surface storage projects generally have less environmental impacts than new on-stream projects. Nevertheless, both surface and groundwater storage projects create additional environmental impacts, including on-site impacts and direct and cumulative impacts caused by water diversions into the storage projects. Further, inappropriate public investments in new surface or groundwater storage may reduce incentives to invest in water conservation programs and other water management strategies.

Based on a programmatic evaluation of potential water supply benefits and practical consideration of acceptable levels of impacts and total costs, the range of total new storage considered for evaluation in Phase II was from zero up to about 6 MAF. This was considered a reasonable range for study purposes and impact analysis; more detailed study and significant interaction with stakeholders will be required as project-level planning and environmental analysis occurs at specific locations. Most water supply benefits of Sacramento River off-stream or enlarged on-stream surface storage are achieved with about 3 MAF of storage, while most water supply benefits of south of Delta off-aqueduct surface storage are attained with about 2 MAF of storage. Other types of surface storage considered in Phase II include San Joaquin River tributary storage and in-Delta storage.

Considering the magnitude of conflicts over available water in California, CALFED believes that it must continue to evaluate and implement a broad range of water management options to achieve the Program's objectives. Therefore, new or expanded storage will be developed and constructed, together with aggressive implementation of water conservation, recycling, an improved water transfer market, and habitat restoration, as appropriate to meet CALFED Program goals. Implementation of new or expanded surface and groundwater storage will be predicated upon completing site-specific feasibility studies and complying with all environmental review and permitting requirements.

Site-specific studies of storage opportunities will be coordinated under the ISI. Specifically, the ISI will evaluate surface storage, groundwater storage, power facility re-operation, where appropriate, and the potential for conjunctive operation of these different types of storage. These

investigations, as part of the Water Management Strategy, will contribute to compliance with the Clean Water Act Section 404 Guidelines requirement to select the least environmentally damaging practicable alternative to constructing new storage facilities. Additionally, these investigations will provide a comprehensive assessment and prioritization of critical fish migration barriers for modification or removal.

The study elements within the Integrated Storage Investigation include:

Comprehensive Planning The ISI will provide information to help CALFED continue to refine and periodically update the Water Management Strategy. ISI studies will evaluate the utility of specific storage projects in providing water quality, water supply reliability and ecosystem benefits. This information, together with information gained from implementation of other CALFED Program elements and updated information on California's changing water management needs, will be considered in an Evaluation Framework. This Framework will include: (1) a comprehensive hierarchy of objectives for the CALFED Program, (2) well-defined measures of performance associated with the achievement of objectives, and (3) provide a basis for comparison of alternative long-term water management strategies. The Evaluation Framework will provide a structure for periodically updating the Water Management Strategy and determining appropriate levels of future investment in various water management tools.

Groundwater/Conjunctive Use Programs CALFED has developed a framework for evaluation and development of additional groundwater and conjunctive use opportunities, based on voluntary participation by local water management entities. The proposed framework would provide opportunities for intensified groundwater monitoring, modeling, and evaluation of local and regional opportunities as well as potential impacts and mitigation requirements. It calls for use of pilot studies to methodically assess opportunities and impacts before full implementation. In addition, DWR and USBR are pursuing cooperative partnerships with local agencies to study and implement specific groundwater banking and conjunctive use opportunities. DWR's North of Delta Off-Stream Storage Study also includes evaluation of opportunities for exchanges and groundwater management in conjunction with surface storage. The ISI will identify beneficial pilot projects and develop operational strategies to optimize conjunctive management opportunities with existing and potential new surface storage. See Groundwater and Conjunctive Management below for more detail.

Surface Storage Investigations CALFED and its cooperating agencies have conducted a preliminary screening of potential surface storage locations and project configurations, then selected a smaller number for more detailed evaluation. The screening process, although it has already provided preliminary guidance for more detailed investigations, continues to be refined to assure consistency with current planning conditions and available environmental data.

Subsequent evaluation will focus on surface storage sites with the most potential for helping meet CALFED goals and objectives in Stage 1. These will include Shasta Lake Enlargement, Los Vaqueros Enlargement, and In-Delta Storage. In addition, CALFED will evaluate Millerton

Lake Enlargement or equivalent and Sites Reservoir to better define benefits, impacts, and potential implementation. Investigations will be based on engineering, economic, and environmental considerations. See Surface Storage below for more detail.

Power Facilities Reoperation Evaluation Regulatory reform in the electrical power industry has presented an opportunity to evaluate whether existing hydroelectric facilities can be acquired and re-operated for water supply purposes. CALFED's initial evaluation is that, after considering the effects of re-operation on downstream users, water quality, environmental resources, power production, and recreation, the opportunities may be limited, especially at the smaller reservoirs. Nevertheless, these facilities already exist, and could offer benefits for local water supplies or for an Environmental Water Account, as well as providing additional operational flexibility.

Fish Migration Barrier Removal Evaluations As part of CALFED's Ecosystem Restoration Program, some obstructions to fish passage (such as small dams) are being considered for modification or removal in order to restore anadromous fish access to critical spawning habitat. There is a need for a more systematic approach to identifying and prioritizing barriers for future action. The scope of ISI provides an opportunity for such a comprehensive assessment.

Groundwater and Conjunctive Management

One of the major elements of the ISI program includes surface water and groundwater conjunctive management. The goal of the conjunctive management element is to assist local agencies with improving regional water supply reliability by increasing the coordinated use of surface water and groundwater. Working cooperatively, local agencies, basin stakeholders, and DWR on behalf of CALFED will conduct technical, economic, social, and environmental feasibility evaluations of possible conjunctive management projects within each basin.

Appropriate and effective groundwater management and protection is essential to an effective water management strategy and to the success of a broad range of CALFED programs, including water transfers, groundwater banking, watershed management and water use efficiency programs. CALFED recognizes the critical role of local government agencies in protecting and managing groundwater resources, and will actively pursue cooperative partnerships with local agencies to facilitate planning for and implementation of groundwater banking and conjunctive use programs.

To ensure that local concerns and potential impacts are fully addressed, CALFED developed guiding principles for conjunctive use. These principles will frame CALFED's role and participation in conjunctive use programs:

- Local planning processes will be employed.
- Proposed projects will include local control and management.

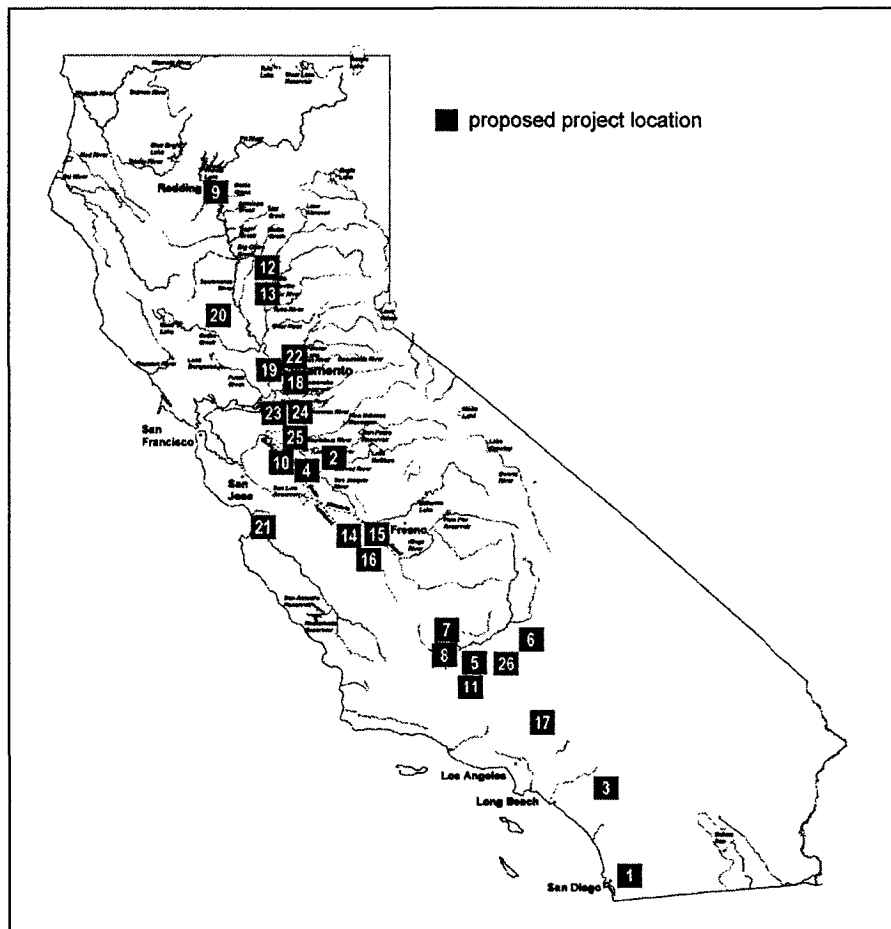
- Implementation of projects will be voluntary.
- In-basin water needs will have priority.
- Out-of-basin transfers will be subject to local management and include compensation.
- Basin-wide planning and monitoring will be implemented.

CALFED's Conjunctive Use Advisory Team, which included stakeholders and staff from CALFED agencies, used the guiding principles to develop a Conjunctive Use Grant program as a preliminary phase of the ISI program. This grant program will help implement locally supported conjunctive use programs that adhere to CALFED's guiding principles.

CALFED received twenty-six grant applications under the Conjunctive Use Grant Application program (see following map and table).

CALFED Conjunctive Use Grant Application Submittals

General Project Locations: 26 Responses



CALFED Conjunctive Use Grant Application Submittals

Application No.	Project Name
1	Sweetwater Monitoring Wells for Groundwater Demineralization Facility
2	Eastside WD Pilot Groundwater Recharge Basin
3	Elsinore Valley MWD Gage Canal Extraction & Conveyance
4	San Luis & DMWA Regional Conjunctive Use Program
5	Kern-Tulare Conjunctive Use Project
6	Kern County WA Kern Fan Groundwater Pump-In Project
7	Semitropic Banked Water Recover Hookups
8	Semitropic Construction of Monitoring Wells
9	Anderson-Cottonwood ID CU Program
10	City of Tracy Aquifer Storage & Recovery Project
11	Buena Vista WSD Conveyance Improvements for Recharge Ponds
12	Western Canal WD Conjunctive Use Monitoring Project
13	Richvale ID Conjunctive Use Monitoring Project
14	San Luis WD Meyers Farm Groundwater Banking Project
15	San Luis WD Devine Groundwater Banking Project
16	Westlands WD Water Supply Management and CU Program
17	Antelope Valley Littlerock Creek Groundwater Recharge Project
18	City of Sacramento American River Crossing 48-inch Water Main
19	Natomas Central MWC Conjunctive Use Project
20	Maxwell ID Conjunctive Use Project
21	Pajaro Valley Pajaro River at Murphy Crossing
22	ARBCA Regional Conjunctive Use Program
23	San Joaquin County-Wide Conjunctive Use Project
24	North San Joaquin WCD Pilot Recharge Project
25	Stockton East WD Demonstration Groundwater Recharge
26	City of Bakersfield Riverlakes Tie-In

As of the writing of this document, the CALFED selection committee is evaluating and scoring those applications. Up to \$2.15 million is available for this fiscal year, with a maximum grant amount of \$500,000 per project.

Work completed to help develop CALFED's Water Management Strategy included an evaluation of potential groundwater storage in the Central Valley. The preliminary results of this evaluation

revealed that conjunctive management programs that utilize groundwater storage could provide significant improvements in water supply reliability. As a result, CALFED has developed a target of implementing locally managed and controlled groundwater and conjunctive use projects with a total of 500 TAF to 1 MAF of additional storage capacity by 2007 under the ISI program.

These projects will be implemented under the ISI program through partnerships with local and regional interests to obtain local and CALFED Program benefits. As of June 2000, three memoranda of understanding have been negotiated between the ISI program and local agencies. To build on the current ISI efforts, Stage 1 actions will include:

- Finalize agreements with up to six new local project proponents for joint planning and development by February 2001.
- Begin feasibility studies by March 2001 with funding through CALFED and Proposition 13.
- Report on the performance of feasibility studies, implementable projects, and potential benefits and beneficiaries by the end of 2002. The report will separately identify likely local benefits as well as opportunities to benefit statewide water supply reliability and the Environmental Water Account.
- Implement early stages of the most promising projects by the end of 2004. Aggressively pursue implementation of additional projects by the end of Stage 1.

The Implementation Plan in Chapter 4 includes proposed groundwater banking and conjunctive use actions for Stage 1.

Comprehensive groundwater management in California has been an elusive goal, in part because most groundwater is managed at the local level by various water districts and agencies. Ideally, groundwater would be managed by local agencies at the sub-basin level through the planned coordination of local agency groundwater management plans. Groundwater sub-basins, as defined in the Department of Water Resources Bulletin 118, would provide appropriate boundaries for this coordinated planning approach. Such a management system would avoid potential conflicts among groundwater management plans within sub-basins. Therefore, CALFED will support legislation that supports coordinated groundwater management by local agencies at the sub-basin level. CALFED's objective with respect to basin-wide planning is to encourage local agencies to coordinate and integrate existing AB 3030 plans to accomplish stakeholder-driven basin management objectives, while keeping in tact the goals and elements of local plans.

AB 3030, which authorizes local agencies to enact voluntary groundwater management plans within their boundaries, is an important foundation for comprehensive groundwater management in California. AB 3030 also allows agencies to enter into agreements to develop basin-wide

plans but does not require such basin-wide plans to be developed. DWR will adopt regulations for expenditure of grant and loan funds that make funding contingent upon local agencies having an AB 3030 plan or a functional equivalent in place. CALFED will work with local governments and affected stakeholders to develop legislation to strengthen AB 3030 to encourage basin-wide groundwater management plans, in part by conditioning future state funding for water programs on the development of local groundwater management plans by 2004.

CALFED will work with the Legislature to help move California toward basin-wide groundwater management through the coordinated implementation of local agency planning efforts. New legislation should call for management plans that promote the objective of increasing overall water supply reliability while protecting against localized loss of access to water supply, degradation of water quality, and subsidence. This legislation should address the following issues:

AB 3030 - AB 3030 allows local agencies to develop and implement local groundwater management plans. AB 3030 should be strengthened to ensure specific groundwater management plans are completed. Additionally, agencies and districts sharing the same sub-basin should develop coordinated management plans that address both groundwater and surface water. A realistic time frame for agencies to complete groundwater management plans would be two to three years from the date legislation is passed. The legislation should provide that agencies must complete timely plans to maintain access to state water program funding.

California Water Code - Many sections of the Water Code contain language that is either ambiguous or restrictive with regard to facilitating conjunctive use, groundwater banking and groundwater transfers. For example, Water Code Section 1220 precludes the pumping of groundwater for export from the Delta-Sierra Basin, as defined in DWR's Bulletin 160-74, unless the pumping is in compliance with certain conditions. Currently, there are differences in opinion as to what these conditions mean and how they are applied. The new legislation should provide remedy for these uncertainties, while maintaining protections for local groundwater resources.

County Ordinances - The Water Code should be amended to require that county groundwater management ordinances and groundwater management plans adopted by water agencies under AB 3030 or other statutory authority be consistent. The combination of local government ordinance and local agency management plan should complement each other in establishing basin management objectives to increase water supply reliability.

State-level Oversight - CALFED, the Resources Agency, or the Department of Water Resources should provide guidance for local management of surface water and groundwater resources, coordinated at the sub-basin level. Annual reports that discuss

basin water quality, a water budget and coordination activities among agencies and local government would be appropriate. The legislation should contain provisions to clarify the scope of local agencies' authority to manage groundwater, and should provide default rules and definitions to resolve conflicts and ambiguities in local groundwater management schemes.

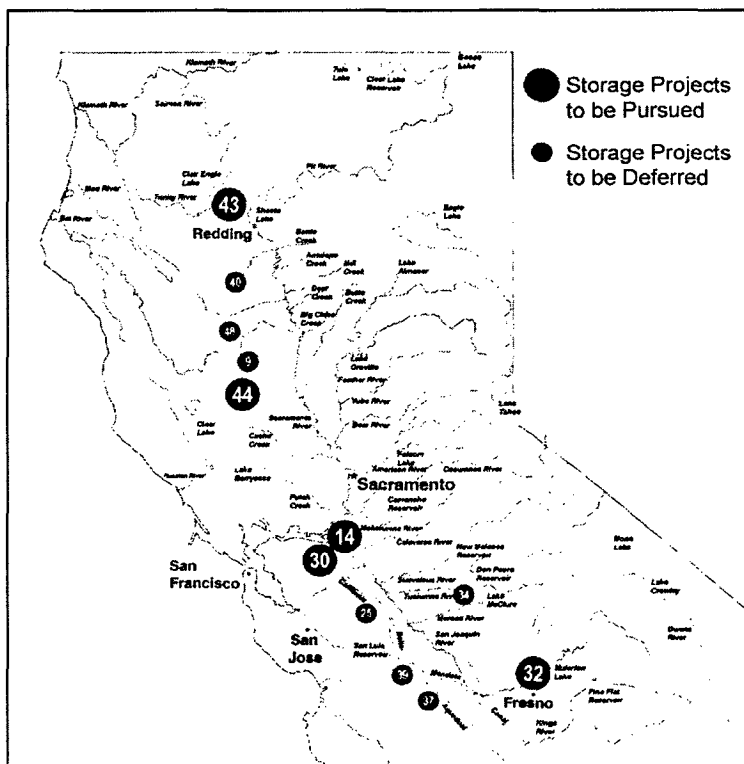
Development of Management Plans - Development of effective groundwater management plans will require improvement in our current scientific understanding of groundwater resources. Few regions have good data on how groundwater moves underground, how fast it recharges, how much can be withdrawn before subsidence occurs, or vegetation is adversely affected. The Department of Water Resources is currently updating DWR Bulletin 118 by collating existing data to establish a water budget for each groundwater basin. At present, this effort is funded for a period of three years.

This program should be funded as a continuous program to collect information on groundwater conditions in each basin to better understand how to manage the resource effectively. AB 303, introduced in 1999, would continue the work undertaken during the current DWR Bulletin 118 update but would provide for collection of additional data. AB 303 would establish a grant program to be administered by the DWR to assist local public agencies with groundwater monitoring and management activities; provide funding for the DWR to update, digitize, evaluate and expand groundwater databases and to update DWR Bulletin 118; and would require that all data generated by such funding would be available to the public. CALFED believes that the provisions of AB 303 should be supported.

Surface Storage

CALFED will focus on off-stream reservoir sites for new surface storage, but will consider expansion of existing on-stream reservoirs. CALFED will not pursue storage at new on-stream reservoir sites. Under the ecosystem restoration program element, some dams and stream obstructions will be removed

Potential Surface Storage Projects



to open additional areas of aquatic habitat to anadromous fish.

For the purposes of the Phase II evaluation, an inventory of fifty-two potential new surface storage projects was compiled. Those projects that appeared most feasible (see above, figure of potential surface storage sites) were identified in the June 1999 Draft Programmatic EIS/EIR and retained for further CALFED consideration. These include twelve potential projects that could contribute significantly to CALFED's multiple purpose objectives. Since release of the June 1999 Draft, CALFED has determined that several of these twelve projects should be pursued in Stage 1, while others should be deferred, as described below.

Analysis conducted for the Environmental Water Account (EWA) has shown a strong need for additional storage to make an EWA work. Without access to additional storage, it is much more difficult to acquire the resources (water) to make an EWA work and provide adequate fish protection, while at the same time maintaining and improving water supply reliability. In the short term, the EWA will need to depend on water purchases/transfers, and this will dominate the water transfers market, making transfers more difficult and or more expensive for other water users. In the longer term, it appears that new or expanded storage will be necessary so that transfer water and conveyance capacity can be made available for other users including upstream environmental users.

Offstream Storage

Traditionally, reservoirs have been created by constructing dams on major rivers to form artificial lakes. These reservoirs are considered onstream storage. In contrast, an offstream storage reservoir is typically constructed on a small and generally seasonal stream that does not significantly contribute to the water supply of the reservoir. Offstream storage involves diverting water out of a river and transporting the water through canals or pipelines to a reservoir that may be miles away from the river. Therefore, offstream storage investigations include extensive evaluation of conveyance facilities to carry the water to the reservoirs.

Based on existing information, some potential storage facilities appear to be more promising in contributing to CALFED goals and objectives and more implementable due to relative costs and stakeholder support. CALFED has organized the potential storage projects into three tiers to reflect these characteristics and guide the next steps in the ISI.

Potential Storage Retained for Additional CALFED Consideration			
Project	Location	Type	Gross Storage Capacity
Storage Projects to Be Pursued			
Shasta Lake Enlargement (6 to 8 foot raise of existing dam) (Site 43)	Shasta County Sacramento River	On-Stream Storage	Approximately 300 TAF Additional
Los Vaqueros Enlargement (Site 30)	Contra Costa County Kellogg Creek	Off-Stream Storage	300-400 TAF Additional (up to 965 TAF potential)
In-Delta Storage (Site 14)	Sacramento/San Joaquin Delta	Island Storage in the Delta	250 TAF
Groundwater Conjunctive Use	Sacramento Valley, San Joaquin Valley & So. CA	Long-Term Funding Locally Supported	500 TAF - 1 MAF
Millerton Lake Enlargement or Equivalent (Site 32)	Fresno County San Joaquin River	On-Stream Storage	Additional 720 TAF
Sites Reservoir (Site 44)	Colusa and Glenn Counties Funks & Stone Corral Cks	Off-Stream Storage	1,200 to 1,900 TAF
Storage Projects to be Deferred			
Ingram Canyon Reservoir [Complete ongoing estimates of cost, benefits and impacts, then no further action] (Site 25)	Stanislaus County Ingram Creek	Off-Stream Storage	333 to 1,201 TAF
Montgomery Reservoir (Site 34)	Merced County Dry Creek	Off-Stream Storage	240 TAF
Panoche Reservoir (Site 37)	Fresno County Silver Creek	Off-Stream Storage	160 to 3,100 TAF
Quinto Creek Reservoir (Site 39)	Merced/Stanislaus County Quinto Creek	Off-Stream Storage	332 to 381 TAF
Colusa Reservoir Complex (Site 9)	Colusa/Glenn Counties Funks Creek	Off-Stream Storage	3,300 TAF
Schoenfield Reservoir portion of the Red Bank Project (Site 40)	Tehama County S.F. Cottonwood Creek	Off-Stream Storage	Schoenfield-250 TAF
Thomes-Newville Reservoir (Site 48)	Glenn County Thomes & Stoney Creek	Off-Stream Storage	1,840 - 3,080 TAF

Storage Projects to be Pursued These projects appear to be the most promising in helping to meet CALFED goals and objectives including providing water for a long-term EWA. Based on existing information, they would provide significant benefits and generally result in lower environmental impacts than the remaining sites. Overall, they appear to be the most implementable of the potential storage sites. CALFED will aggressively pursue these projects through full State and Federal commitment to the process and evaluations necessary for implementation. Decisions on the implementation could occur early in Stage 1. CALFED will focus the ISI evaluations on the following projects:

Shasta Lake Enlargement - The Shasta Lake Enlargement would include a 6- to 8-foot raise of the existing dam, expanding capacity by approximately 300 TAF. The enlargement could help offset losses of Trinity River diversions to the Sacramento River, improve the cold water reserve in Shasta Lake to regulate Sacramento River water temperatures, and improve overall water supply reliability. The most significant environmental impact appears to be inundation of a few hundred yards of the McCloud River; the California Public Resources Code Section 5093.542 seeks to protect the free-flowing McCloud River but also provides for investigations for potential enlargement of Shasta Dam.

Los Vaqueros Enlargement - A 300 to 400 TAF enlargement of the existing Los Vaqueros Reservoir could provide unique opportunities for blending to improve Bay-Area drinking water quality and water supply reliability. Its proximity to the Delta would allow filling during times of better Delta water quality. As an existing offstream reservoir, environmental impacts are expected to be relatively low. This effort is subject to a number of mandates and agreements, including a requirement for local voter approval.

In-Delta Storage - Evaluations for the Environmental Water Account have shown the advantages of having storage near the south Delta export facilities. This storage can provide significant benefits in providing additional flexibility in timing of Delta exports and in improving overall water supply reliability. The storage would be formed by transforming one or more Delta islands into storage reservoirs with a capacity of approximately 250 TAF. Impact concerns for in-Delta storage include water quality degradation from storage of water over peat soils and change of land use from agricultural to a storage reservoir.

Groundwater Conjunctive Use - Groundwater conjunctive use can provide opportunities to improve timing and availability of water for all users. Generally, groundwater projects are viewed as having more benign on-site environmental and land use impacts than surface storage. CALFED plans funding for 500 TAF to 1 MAF of new locally supported groundwater projects in Stage 1. While CALFED may also participate in projects in the Sacramento Valley and Southern California, the San Joaquin Valley

appears to provide significant opportunities for early implementation of valuable groundwater conjunctive use projects.

In addition, CALFED will study two potential reservoir locations through partnerships with local agencies:

Millerton Lake Enlargement or Equivalent - An enlargement of Millerton Lake, or equivalent, should be considered in the context of broader San Joaquin River water management including flow and habitat restoration, flood management, conjunctive use, reservoir re-operation and water transfers. The offstream Montgomery Reservoir would be evaluated as one alternative to a Millerton Lake Enlargement. A feasibility study is needed to better define potential benefits and impacts and how the project could complement other ongoing restoration activities on the San Joaquin River.

Sites Reservoir - Sites Reservoir could help water supply reliability for all uses. The project formulation includes consideration of a water exchange program to use the water supply of the project for agricultural and wetland uses within the Colusa Basin in exchange for modifications to diversion patterns from the Sacramento River. Based on preliminary information from the ongoing feasibility evaluation, Sites Reservoir would have less environmental impacts than Thomes-Newville Reservoir, the Colusa Reservoir Complex, or Schoenfield Reservoir. The feasibility study will provide information necessary for a decision on implementation of Sites Reservoir or alternatives.

These two projects will require substantial technical work and further environmental review and development of cost-sharing agreements before decisions to pursue them as part of the CALFED Program. Decisions on implementation would occur in Stage 1.

Storage Projects to be Deferred The remaining sites do not appear to significantly contribute to Program goals and objectives at this time. Some of these may be retained solely for analysis purposes and could serve as alternatives to the above projects. Future progress and experience with implementation of other parts of the Program, such as the Environmental Water Account or south Delta conveyance improvements, could better define potential benefits of these storage projects. CALFED does not plan to pursue implementation of any of the following projects at this time.

Ingram Canyon Reservoir - CALFED is conducting preliminary estimates of costs, benefits and impacts of Ingram Canyon Reservoir. CALFED will complete this preliminary study and then take no further action in Stage 1. New off-aqueduct storage does not show significant contributions to the Program goals and objectives at this time. Current limitations in Delta export capacity also limit the effectiveness of new off-aqueduct storage such as Ingram Canyon. In addition, operation of the Environmental Water Account could further limit the effectiveness of off-aqueduct storage. New groundwater storage in the San Joaquin Valley could further reduce need for off-aqueduct

storage. Improvements in the export capacity, experience with operations associated with the Environmental Water Account, and experience on the effectiveness of new groundwater conjunctive use projects are required before potential benefits of off-aqueduct storage can be better defined.

Montgomery Reservoir - Montgomery Reservoir will be evaluated as an off-stream reservoir alternative to the Millerton Lake Enlargement in Tier Two above.

Panoche Reservoir - New off-aqueduct storage, such as Panoche Reservoir, does not show significant contributions to the Program goals and objectives at this time. (See Ingram Canyon Reservoir).

Quinto Creek Reservoir - New off-aqueduct storage, such as Quinto Creek Reservoir, does not show significant contributions to the Program goals and objectives at this time. (See Ingram Canyon Reservoir).

Colusa Reservoir Complex - Preliminary information from the ISI indicates that the cost of the Colusa Reservoir Complex is high compared with Sites Reservoir. The Colusa Reservoir Complex could be evaluated as an alternative to Sites Reservoir.

Schoenfield Reservoir - CALFED initially envisioned that Schoenfield Reservoir could be economically operated such that the gates at Red Bluff Diversion Dam could be left open longer in the late spring and early summer for fish passage benefits. However, now other promising alternatives for dealing with fish passage at Red Bluff are under investigation by the USBR and may better meet the fish passage needs. In addition, Schoenfield Reservoir appears to have significantly higher environmental impacts than Sites Reservoir. Schoenfield Reservoir could be evaluated as an alternative to Sites Reservoir.

Thomes-Newville Reservoir - Preliminary information from the ISI indicates that the environmental impacts of Thomes Newville Reservoir are high compared with Sites Reservoir. The Thomes Newville Reservoir could be evaluated as an alternative to Sites Reservoir.

The relationship of water supply benefits to groundwater and surface storage volume is highly dependent on operating assumptions. More detailed information about specific locations of new storage, potential allocation of storage benefits, and operational goals and constraints would be necessary to determine an optimal volume of storage from a water supply perspective. In addition, long-term effective groundwater management throughout California will be essential to a range of CALFED Programs, including water transfers, groundwater banking, watershed management, and water use efficiency programs.

A fundamental principle of the CALFED Program is that the costs of a program should be borne by those who benefit from the program. That principle is especially relevant in the decision about new storage facilities. CALFED will seek public financing for the planning and evaluation of storage projects to ensure a comprehensive and fair comparison of storage options. However, should a storage project proceed to construction, then the public funds used for planning and evaluation will be reimbursed by the project beneficiaries. This "beneficiary pays" principle is critical to the overall CALFED goal of increasing the efficiency of water use in California.

Decisions to construct groundwater or surface water storage will be predicated on compliance with all environmental review and permitting requirements, and maintaining balanced implementation of all Program elements. CALFED will undertake an annual review (see the third paragraph of Section 3.7 for more information about this review) to assess progress toward balanced implementation of the Program.

Subject to these conditions, new groundwater and surface water storage will be developed and constructed, together with aggressive implementation of water conservation, recycling, an improved water transfer market, and habitat restoration, as appropriate to meet CALFED Program goals. During Stage 1, through the Water Management Strategy (including the Integrated Storage Investigation) CALFED will continue to evaluate surface water and groundwater storage; identify acceptable site-specific projects; and initiate permitting, NEPA and CEQA documentation, and construction—if all conditions are satisfied.

In addition, groundwater/conjunctive use programs will be developed in tandem with the following actions:

- Groundwater monitoring, and modeling programs are established
- Full recognition is given to the rights of landowners under existing law
- Guidelines are in place to protect resources, address local concerns, and avoid potential impacts prior to and during implementation of a conjunctive management operation.

The CALFED Program has no specific objectives for hydropower generation. However, CALFED does seek to minimize negative impacts on resources, such as hydropower generation, during and after implementation. The Program may result in temporary or long-term changes in river and reservoir operations, which may affect the quantity, timing and value of hydropower produced within the Bay-Delta system. CALFED is coordinating with the Western Area Power Administration to assure that issues are identified and properly framed, so consequences and options are clear to stakeholders, the public, and CALFED.

3.6.6 Water Management Strategy Tools: The Environmental Water Account

The Environmental Water Account (EWA) is part of CALFED's Water Management Strategy, designed to improve fisheries protection and recovery while providing improvements in water quality and water supply reliability. The EWA will rely on more flexible management of water based on real-time needs of the fishery resources. The EWA functions primarily by changing the timing of some flow releases from storage and the timing of water exports from the south Delta pumping plants to coincide with periods of greater or lesser vulnerability of various fish to Delta conditions. The EWA will be established to provide water for protection and recovery of fish beyond water available through existing regulatory actions related to project operations.

EWA and Prescriptive Standards

The EWA is based upon the concept that flexible management of water will achieve fishery and ecosystem benefits more efficiently and to a greater degree than a completely prescriptive regulatory approach. Management of EWA "assets" (water, storage, money, operation rights) on a real-time basis can result in lower overall costs of environmental protection than under a purely prescriptive approach and can provide for enhanced environmental benefits (i.e., restoration and recovery). This would help attain water supply reliability objectives for water users and improve fisheries conditions. In addition, by managing the EWA in close coordination with other parts of the water management strategy, multiple benefits may sometimes be achieved from the use of EWA assets. For example, at times EWA water to achieve a fishery purpose also may provide water quality benefits.

EWA Development

To gain insight into whether and how an EWA could improve fish conditions while protecting water quality and water supply benefits, CALFED Agency staff and stakeholders have simulated numerous EWA /CVPIA operations scenarios. These EWA "gaming" exercises allowed project operators, fishery agency biologists and stakeholders to work together to simulate operational decisions to react to the changing hydrological and biological conditions typical of the Sacramento-San Joaquin watersheds and the Delta. The simulations allowed them to see how the system may respond to potential configurations and applications of EWA assets.

A number of simulations were conducted to better understand how an EWA might have been operated in "real time" if it had existed during the 1981 through 1994 water years. This period included a variable hydrologic sequence of wet years and dry years to test the EWA, but does not reflect all the variation that EWA management could encounter. In each simulation, the EWA had access to a different collection of facilities, contracts, rights, and income. Differing assumptions were also made about the application of CVPIA Section 3406 b(1) and b(2). In

some simulations, the EWA had access to new storage and/or new export pumping capacity. In all simulations the EWA had access to unused project capacity and the ability to allow variances in application of the Export/Inflow standard in order to generate environmental water. In some simulations, the EWA had a budget for water purchases. One simulation was run solely to determine how much water would be required to achieve "adequate" biological protection from the point of view of the fishery agencies.

Changes in operations were simulated using a set of assumed EWA and historical hydrology and fish salvage records, starting from a model representation of project operations with current regulatory conditions.

EWA Structure

During Stage 1, the EWA would work from a foundation of the existing regulatory regime. The EWA would not be a substitute for existing prescriptive standards but would avoid potential new standards. The EWA will be established to provide water for the protection and recovery of fish beyond water available through existing regulatory actions related to project operations. The EWA will benefit water users by providing additional water for fish without the need to reduce project deliveries. The EWA will be authorized to acquire, bank, transfer and borrow water and arrange for its conveyance. EWA assets will be managed by the federal and state fishery agencies (USFWS, NMFS, and CDFG) in coordination with project operators and stakeholders, through the CALFED Operations Group. Initial acquisition of assets for the EWA will be made and funded by Federal and State agencies (USBR and DWR).

Three Tiers of Environmental Water

Tier 1 - Regulatory Baseline - existing regulation and operational flexibility.

Tier 2 - Environmental Water Account - average 380,000 acre-feet annually with borrowing and payback.

Tier 3 - Additional water only when necessary - a commitment by CALFED agencies to make additional water available should it be needed.

To provide regulatory stability during the initial period of Stage 1, the CALFED agencies will provide a commitment, subject to legal requirements, that for the first four years of Stage 1, there will be no reductions, beyond existing regulatory levels, in CVP or SWP deliveries from the Delta resulting from measures to protect fish under the federal and state Endangered Species Acts. This commitment will be based on the availability of three tiers of assets. Tier 1 is baseline environmental protection, provided by existing regulation and operational flexibility. The regulatory baseline consists of the biological opinions on winter-run chinook salmon and delta smelt, 1995 Delta Water Quality Control Plan, and 800 TAF of CVP Yield pursuant to CVPIA Section 3406(b)(2).

The Regulatory Baseline, Tier 1 Assets:

The regulatory baseline, which provides the assets in Tier 1, consists of:

1993 Winter-run Biological Opinion (NMFS)

1995 Delta Water Quality Control Plan (SWRCB)

- To address the potential, which may arise in rare circumstances, that the CVP obligation under the WQCP exceeds the 450 TAF annual cap for use of (b)(2) water, CALFED agencies will develop a strategy, using their available resources, to create an insurance policy that will seek to eliminate impacts to water users, while not adversely affecting other uses. See drought contingency plan.

1995 Delta Smelt Biological Opinion (FWS)

- The 2-to-1 export/inflow ratio will be met by the CVP and EWA.

Full Use of 800 TAF Supply of Water Pursuant to Section 3406(b)(2) of the CVPIA in accordance with Interior's October 5, 1999 Decision, clarified as follows:

- Water Resulting from Refill of Reservoirs ("Reset"): Water which is available under the (b)(2) Policy as a result of refill of reservoirs following upstream releases ("reset") will not be used in a manner which results in increased export reductions. Upstream releases of (b)(2) water pumped by the SWP and made available to the EWA will not be subject to the "reset" provision.
- Export Curtailments which Result in Increased Storage ("Offset"): Where a prescribed (b)(2) export curtailment results in a reduction in releases from upstream reservoirs and hence increased storage, the charge to the (b)(2) account will be offset to the extent that the increased storage will result in increased delivery (beyond forecast delivery at the time of the export curtailment) to export users in the remainder of the water year. Where the delivery to export users in the remainder of the water year will not be increased and end-of-year storage will be increased, there will be no offset to the charge to the (b)(2) account.

In addition, Tier 1 and Tier 2 assets will be supplemented by flexible operations that do not reduce deliveries to project water users.

Tier 2 consists of the assets in the EWA combined with the benefits of the ERP and is an insurance mechanism that will allow water to be provided for fish when needed without reducing deliveries to water users. Tier 1 and Tier 2 are, in effect, a water budget for the environment and will be used to avoid the need for Tier 3 assets. It is unlikely that assets beyond those in Tier 1 and Tier 2 will be needed to meet ESA requirements. However, if further assets are needed in specific circumstances, a third tier will be provided. Tier 3 is based upon the commitment and ability of the CALFED agencies to make additional water available should it be needed. In considering the need for Tier 3 assets, the fishery agencies will consider the views of an independent science panel. Tier 3 assets may include additional purchases from willing sellers or consensual "borrowing" of water beyond the collateral-based borrowing which is allowed as part of the EWA (Tier 2).

Environmental Water Account Tier 2 Initial Assets

Action Description	Water Available Annually (Average)
SWP Pumping of (b)(2)/ERP Upstream Releases ¹	40,000 acre-feet ²
EWA Use of Joint Point ³	75,000 acre-feet
Export/Inflow Ratio Flexibility	30,000 acre-feet
500 cfs SWP Pumping Increase	50,000 acre-feet
Purchases - South of Delta	150,000 acre-feet
Purchases - North of Delta ⁴	35,000 acre-feet
TOTAL	380,000 acre-feet

Immediate development of assets for the first year is critical to EWA success. Initial water purchases and lease of groundwater storage will be secured from willing sellers by the end of 2000. In addition to assets to be acquired annually, as shown in the table above, an initial one-time deposit of water equivalent to 200 TAF of south-of-Delta storage will be acquired from a variety of sources to assure the effectiveness of the EWA and provide assurances for SWP and CVP water supply/deliveries.

Borrowing agreements will allow the EWA to borrow water from the Projects for necessary actions during a water year as long as the water can be repaid without affecting the following year's allocations. To the extent practicable, borrowing from the SWP and CVP will be equitably shared. The limitations on borrowing will be developed as part of the agreement.

Source shifting agreements with south-of-Delta water providers for 100 TAF will be used to enhance the effectiveness of the EWA, and to help provide assurance that SWP and CVP water deliveries and operations will not be affected by EWA operations.

¹ The EWA and the SWP will share equally the (b)(2) and ERP upstream releases pumped by the SWP after they have served their (b)(2) and ERP purposes.

² The amount of water derived from the first four actions will vary based on hydrologic conditions.

³ The EWA will share access to joint point, with the CVP receiving 50% of the benefits.

⁴ This is the amount of water targeted for the first year; higher amounts are anticipated in subsequent years.

The ESA commitment will be in effect for four years based on ERP implementation and all of the agreed upon assets being available in that period. It is anticipated that sufficient assets, either from existing sources or from supply augmentation, will be available for the protection of fish beyond the first four years, and that the commitment will be extended. The only exception to this commitment would arise in the extremely unlikely event that, despite the utilization of all measures available in the three tiers, a determination is made that a situation of jeopardy to a listed species nevertheless is likely.

The EWA would make use of all of the water management tools as shown in the previous table. Especially in its first few years of operation, a substantial portion of the assets needed for the EWA will come from access to existing Project flexibility, new changes in project flexibility (joint point of diversion, export/inflow [E/I] ratio flexibility, etc.) and through voluntary purchases (estimated at \$50 million annually) on the water transfer market. Given these market based water transfers, the EWA will have an effect on the cost and availability of water transfer capacity.

Generally it appears that the EWA “performance” increases as the EWA’s access to surface and groundwater storage increases. Flexibility in project operations and improvements in conveyance facilities can both help deliver environmental water at the desired place and time and can help create new EWA “assets.” This flexibility is essential for the EWA for it must be operated in tandem with (b)(1), (b)(2) and (b)(3) water provided under Section 3406 of the CVPIA. Finally, the EWA cannot function without the comprehensive monitoring program envisioned in CALFED’s Science Program.

Water quality concerns must also be considered in managing the EWA. Operational changes to enhance the protection of aquatic resources and maintain export supplies have the potential to affect water quality, either positively or negatively. Management of the EWA must be coordinated closely with operation of the State and Federal water projects and the CALFED Water Quality Program.

The EWA will provide fisheries protection and recovery while providing improvements in water supply reliability primarily by changing the timing of some flow releases from storage and the timing of water exports from the south Delta pumping plants. These real-time operational changes will be dependent on assessment of and response to varying conditions. For example, water exports from the Delta may be reduced at times when certain fish species are most vulnerable to this pumping and may be increased when the fish are less vulnerable. The timing of operational changes would vary from year to year depending on many factors such as hydrology and real-time monitoring that shows the movement and presence of fish. Examples of how the EWA may use its assets follows:

- If additional export reductions are needed to protect Delta smelt during late May and June, the EWA compensates for the quantity of export foregone by turning over to State and Federal Project water users EWA water previously pumped and now stored in San Luis Reservoir. If the EWA had not previously stored water in San Luis Reservoir it would temporarily borrow stored State and/or Federal water in San Luis Reservoir.
- Since EWA is not allowed to cause any new delivery reductions, it must pay back most or all of the borrowed water in time to avoid impact on the current year’s deliveries or the following year’s allocations.

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- The EWA would repay the loan using various available assets. It might:
 - ▶ Use EWA groundwater supplies in the export area.
 - ▶ Invoke water purchase contracts in the export area.
 - ▶ Invoke agreements with local agencies in the export area whereby the agencies have agreed to meet some part of their water use from local sources (groundwater or surface storage) until after the low point in San Luis Reservoir storage is passed.
 - ▶ Relax the E/I standard to move more water to the export area.
 - If the San Luis low point could be passed without the repayment of all the debt, the EWA might carry the debt into the next winter in the hopes that high Delta inflows would allow San Luis Reservoir to refill without additional EWA expenditures.
 - EWA water held upstream can be released to improve instream conditions below the reservoirs and then either, 1) be pumped from the Delta to pay off an EWA debt in San Luis Reservoir or add to EWA water stored there, or 2) left to provide increased Delta outflow.

The CALFED Program will coordinate with EWA implementing agencies (DFG, USFWS and NMFS) to ensure CALFED objectives are being met. Coordination and consultation efforts among the CALFED Operations Group, project operations, ESA management agencies, the ERP program manager and stakeholder groups are intended to ensure that the environmental water acquisitions are consistent with the CALFED program goals and objectives and that conflicts with ESA requirements and project operations are minimized or avoided.

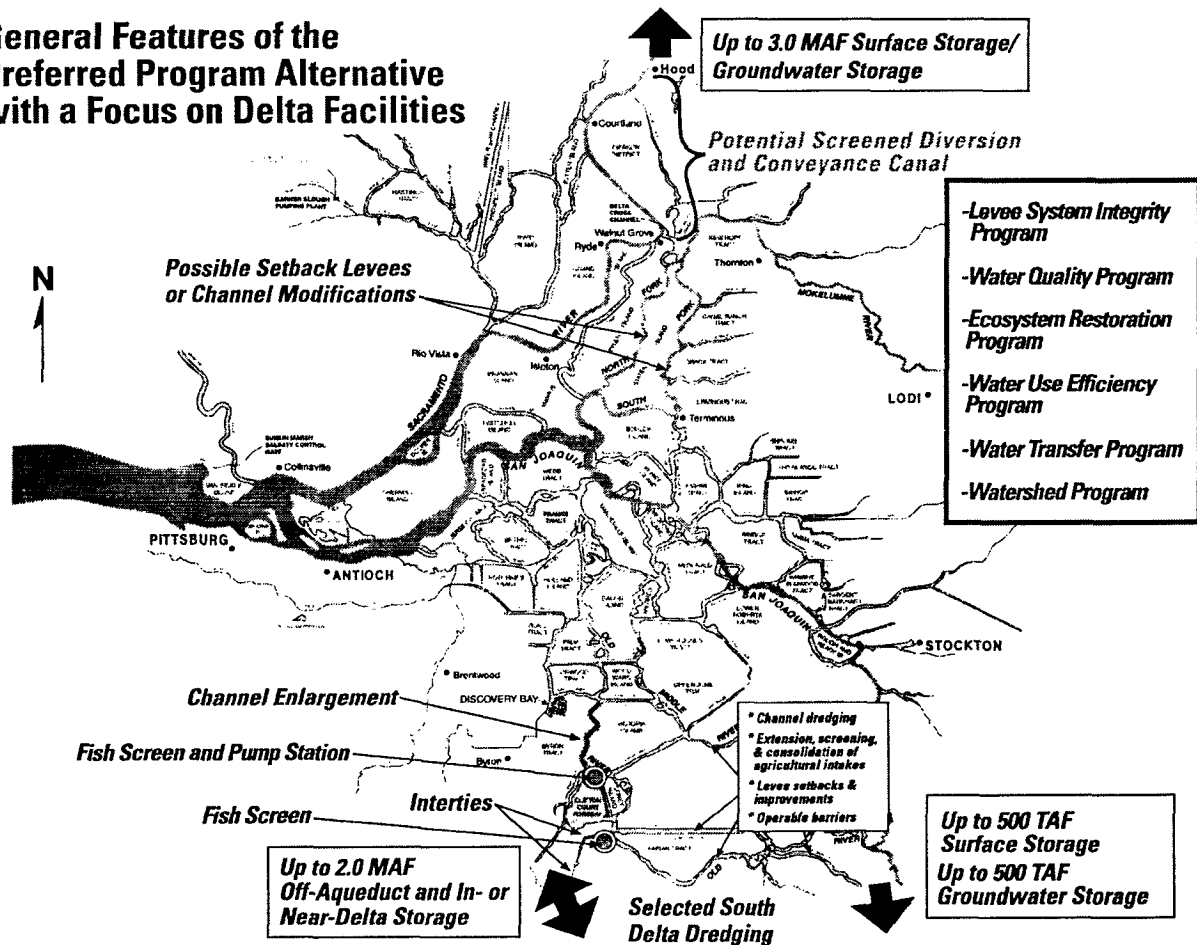
CALFED expects that, as EWA assets become more secure, the regulatory assurances provided during the first four years of Stage 1 will be extended throughout Stage 1. CALFED will develop rules for storing, conveying, and borrowing of EWA water. At the same time, CALFED will develop an accounting process to track the EWA water. Like other parts of the CALFED Program, the EWA will be adaptively managed as experience is gained with its use and effectiveness. In the future, the EWA may gain additional assets as new facilities are implemented or operational changes are made. How EWA will share in the use of these facilities will be determined as these are developed.

3.7 The Preferred Program Alternative

The Preferred Program Alternative consists of a set of broadly described programmatic actions which set the long-term, overall direction of the CALFED Program. The description is programmatic in nature, intended to help agencies and the public make decisions on broad methods to meet Program purposes. The preferred program alternative is made up of the Levee System Integrity Program, Water Quality Program, Ecosystem Restoration Program, Water Use Efficiency Program, Water Transfers Program, Watershed Program, Storage and Conveyance.

Even in this broad programmatic description, actions are intended to take place in an integrated framework and not independently of the other programs. While each program element is described individually, it is understood that only through coordinated, linked, incremental

General Features of the Preferred Program Alternative with a Focus on Delta Facilities



investigation, analysis and implementation can we effectively resolve problems in the Bay-Delta system.

Accordingly, CALFED will annually review the status of implementation of all actions, the progress toward achievement of all goals and objectives, and compliance with Program schedules and financing agreements pertaining to the CALFED Program. In all Program areas, funds for implementation of the Program will continue to be available only if implementation of all actions, progress toward achievement of all goals and objectives, and compliance with schedules and financing agreements are occurring in a balanced manner. In the event that either the Governor or the Secretary of the Interior determines that the Program has not substantially adhered to this balanced implementation, then the Governor and the Secretary will develop and approve a revised program schedule and budget to achieve balanced implementation.

Levee System Integrity Program

The focus of the Levee System Integrity Program is to improve levee stability to benefit all users of Delta water and land. Actions described in this program element protect water supply reliability by maintaining levee and channel integrity. Levee actions will be designed to provide simultaneous improvement in habitat quality, which will indirectly improve water supply reliability. Levee actions also protect water quality, particularly during low flow conditions when a catastrophic levee breach would draw salty water into the Delta.

There are five main parts to the levee program plus Suisun Marsh levee rehabilitation work:

- Delta Levee Base Level Protection Plan - Improve and maintain Delta levee system stability to meet the Corps' PL 84-99 levee standard.
- Delta Levee Special Improvement Projects - Enhance flood protection for key islands that provide statewide benefits to the ecosystem, water supply, water quality, economics, infrastructure, etc.
- Delta Levee Subsidence Control Plan - Implement current best management practices (BMPs) to correct subsidence adjacent to levees and coordinate research to quantify the effects and extent of inner-island subsidence.
- Delta Levee Emergency Management and Response Plan - The emergency management and response plan will build on existing state, federal, and local agency emergency management programs.
- Delta Levee Risk Assessment - Perform a risk assessment to quantify the major risks to Delta resources from floods, seepage, subsidence and earthquakes, evaluate the consequences, and develop recommendations to manage the risk.
- Suisun Marsh Levees - Rehabilitate Suisun Marsh levees.

Water Quality Program

The CALFED Program is committed to achieving continuous improvement in the quality of the waters of the Bay-Delta System with the goal of minimizing ecological, drinking water and other water quality problems, and to maintaining this quality once achieved. Improvements in water quality will result in improved ecosystem health, with indirect improvements in water supply reliability. Improvements in water quality also increase the utility of water, making it suitable for more uses.

The Water Quality Program includes the following actions:

- Drinking water parameters - Reduce the loads and/or impacts of bromide, total organic carbon, pathogens, nutrients, salinity, and turbidity through a combination of measures that include source reduction, alternative sources of water, treatment, storage and if necessary, conveyance improvements such as a screened diversion structure (up to 4000 cfs) on the Sacramento River. The Conveyance section of this document includes a discussion of this potential improvement.
- Pesticides - Reduce the impacts of pesticides through (1) development and implementation of BMPs, for both urban and agricultural uses; and (2) support of pesticide studies for regulatory agencies, while providing education and assistance in implementation of control strategies for the regulated pesticide users.
- Organochlorine pesticides - Reduce the load of organochlorine pesticides in the system by reducing runoff and erosion from agricultural lands through BMPs.
- Trace metals - Reduce the impacts of trace metals, such as copper, cadmium, and zinc, in upper watershed areas near abandoned mine sites. Reduce the impacts of copper through urban storm water programs and agricultural BMPs.
- Mercury - Reduce mercury levels in rivers and the estuary by source control at inactive and abandoned mine sites.
- Selenium - Reduce selenium impacts through reduction of loads at their sources and through appropriate land fallowing and land retirement programs.
- Salinity - Reduce salt sources in urban and industrial wastewater to protect drinking and agricultural water supplies, and facilitate development of successful water recycling, source water blending, and groundwater storage programs. Salinity in the Delta will be controlled both by limiting salt loadings from its tributaries, and through managing seawater intrusion by such means as using storage capability to maintain Delta outflow and to adjust timing of outflow, and by export management.
- Turbidity and sedimentation - Reduce turbidity and sedimentation, which adversely affect several areas in the Bay Delta and its tributaries.
- Low dissolved oxygen - Reduce the impairment of rivers and the estuary from substances that exert excessive demand on dissolved oxygen.

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- Toxicity of unknown origin - Through research and monitoring, identify parameters of concern in the water and sediment and implement actions to reduce their impacts to aquatic resources.

Ecosystem Restoration Program

The goal of the Ecosystem Restoration Program is to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta system to support sustainable populations of diverse and valuable plant and animal species. In addition, the Ecosystem Restoration Program, along with the water management strategy, is designed to achieve or contribute to the recovery of listed species found in the Bay-Delta and, thus, achieve goals in the Multi-species Conservation Strategy. Improvements in ecosystem health will reduce the conflict between environmental water use and other beneficial uses, and allow more flexibility in water management decisions.

The Ecosystem Restoration Program identifies programmatic actions designed to restore, rehabilitate, or maintain important ecological processes, habitats, and species within 14 ecological management zones. Implementation of these programmatic actions will be guided by six goals presented in the Strategic Plan for Ecosystem Restoration. Nearly 100 restoration objectives have been developed which are directly linked to one of the six goals. Each objective further defines the restoration approach for each ecological process, habitat, species or ecosystem stressor. One to several restoration targets have been developed for each objective to set more specific or quantified restoration levels.

Long-term implementation of the Ecosystem Restoration Program will be guided by the adaptive management approach described in the Strategic Plan for Ecosystem Restoration. This approach to restoration will require review by an Ecosystem Restoration Science Review Panel and will rely on information developed in the Comprehensive Monitoring, Assessment, and Research Program.

Representative Ecosystem Restoration Program actions include:

- Protecting, restoring, and managing diverse habitat types representative of the Bay-Delta and its watershed.
- Acquiring water from sources throughout the Bay-Delta's watershed to provide flows and habitat conditions for fishery protection and recovery.
- Restoring critical in-stream and channel-forming flows in Bay-Delta tributaries.
- Improving Delta outflow during key periods.
- Reconnecting Bay-Delta tributaries with their floodplains through the construction of setback levees, the acquisition of flood easements, and the construction and management of flood bypasses for both habitat restoration and flood protection.

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- Developing assessment, prevention and control programs for invasive species.
 - Restoring aspects of the sediment regime by relocating in-stream and floodplain gravel mining, and by artificially introducing gravels to compensate for sediment trapped by dams.
 - Modifying or eliminating fish passage barriers, including the removal of dams, construction of fish ladders, and construction of fish screens that use the best available technology.
 - Targeting research to provide information that is needed to define problems sufficiently, and to design and prioritize restoration actions.

Water Use Efficiency Program

The Water Use Efficiency Program includes actions to assure efficient use of existing and any new water supplies developed by the Program. Efficiency actions can alter the pattern of water diversions and reduce the magnitude of diversions, providing ecosystem benefits. Efficiency actions can also result in reduced discharge of effluent or drainage, improving water quality.

The Water Use Efficiency Program will build on the work of the existing Agricultural Water Management Council and California Urban Water Conservation Council process, supporting and supplementing those processes through planning and technical assistance and through targeted financial incentives (both loans and grants). The Water Use Efficiency Program has identified potential recovery of currently irrecoverable water losses of over 1.4 million acre-feet of water annually by 2020 as a result of CALFED actions. Before execution of the Record of Decision, CALFED will identify measurable goals and objectives for its urban and agricultural water conservation program, water reclamation programs and managed wetlands programs.

Water conservation-related actions include:

- Implement agricultural and urban conservation incentives programs to provide grant funding for water management projects that will provide multiple benefits which are cost-effective at the state-wide level, including improved water quality and reduced ecosystem impacts.
- Identify, in region-specific strategic plans for agricultural areas, measurable objectives to assure improvements in water management.
- Expand state and federal programs to provide increased levels of planning and technical assistance to local water suppliers.
- Work with the Agricultural Water Management Council (AWMC) to identify appropriate agricultural water conservation measures, set appropriate levels of effort, and certify or endorse water suppliers that are implementing locally cost-effective feasible measures.

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- Work with the California Urban Water Conservation Council (CUWCC) to establish an urban water conservation certification process and set appropriate levels of effort in order to ensure that water suppliers are implementing cost-effective feasible measures.
 - Help urban water suppliers comply with the Urban Water Management Planning Act.
 - Identify and implement practices to improve water management for wildlife areas
 - Gather better information on water use, identify opportunities to improve water use efficiency, and measure the effectiveness of conservation practices.
 - Conduct directed studies and research to improve understanding of conservation actions.

Water recycling actions include:

- Help local and regional agencies comply with the water recycling provisions in the Urban Water Management Planning Act.
- Expand state and federal recycling programs to provide increased levels of planning, technical, and financing assistance (both loans and grants) and to develop new ways of providing assistance in the most effective manner.
- Provide regional planning assistance that can increase opportunities for the use of recycled water.

Water Transfer Program

The Water Transfer Program proposes a framework of actions, policies, and processes that, collectively, will facilitate water transfers and the further development of a state-wide water transfer market. The framework also includes mechanisms to provide protection from third party impacts. A transfers market can improve water availability for all users, including the environment. Transfers can also help to match water demand with water sources of the appropriate quality, thus increasing the utility of water supplies.

The Water Transfer Program will include the following actions and recommendations:

- Establish a California Water Transfer Information Clearinghouse to provide a public informational role. The clearinghouse would 1) ensure that information regarding proposed transfers is publically disclosed and, 2) perform on-going research and data collection functions to improve the understanding of water transfers and their potential beneficial and adverse effects.
- Require water transfer proposals submitted to the Department of Water Resources, the U.S. Bureau of Reclamation, or the State Water Resources Control Board to include analysis of potential groundwater, socio-economic, or cumulative impacts as warranted by individual transfers.
- Streamline the water transfer approval process currently used by the Department of Water Resources, the U.S. Bureau of Reclamation, or the State Water Resources Control Board.

This would include clarifying and disclosing current approval procedures and underlying policies as well as improving the communication between transfer proponents, reviewing agencies, and other potentially affected parties.

- Refine quantification guidelines used by water transfer approving agencies when they are reviewing a proposed water transfer. This will include resolving issues between stakeholders and approving agencies regarding the application of current agency-based quantification criteria.
- Improve the accessibility of state and federal conveyance and storage facilities for the transport of approved water transfers.
- Clearly define carriage water requirements and resolve conflicts over reservoir refill criteria such that transfer proponents are acutely aware of the implications of these requirements.
- Identify appropriate assistance for groundwater protection programs through interaction with CALFED agencies, stakeholders, the legislature and local agencies. This is intended to assist local agencies in the development and implementation of groundwater management programs that will protect groundwater basins in water transfer source areas.
- Establish new accounting, tracking, and monitoring methods to aid instream flow transfers under California Water Code Section 1707.

Watershed Program

The Watershed Program provides assistance, financial and technical, to local watershed programs that benefit the Bay-Delta system. Watershed actions can improve reliability by shifting the timing of flows, increasing base flows and reducing peak flows. This also helps to maintain levee integrity during high flow periods. Other watershed actions will improve water quality by reducing discharge of parameters of concern.

The Watershed Program includes the following elements:

- Support local watershed activities - Implement watershed restoration, maintenance, and conservation activities that support the goals and objectives of the Program including improved river functions.
- Facilitate coordination and assistance - Facilitate and improve coordination and assistance between government agencies, other organizations, and local watershed groups.
- Develop watershed monitoring and assessment protocols - Facilitate monitoring efforts that are consistent with the CALFED's protocols and support watershed activities that ensure that adaptive management processes can be applied.
- Support education and outreach - Support resource conservation education at the local watershed level, and provide organizational and administrative support to watershed programs.

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- Define watershed processes and relationships - Identify the watershed functions and processes that are relevant to the CALFED goals and objectives, and provide examples of watershed activities that could improve these functions and processes.

Storage

Groundwater and surface water storage can be used to improve water supply reliability, provide water for the environment at times when it is needed most, provide flows timed to maintain water quality, and protect levees through coordinated operation with existing flood control reservoirs.

Decisions to construct groundwater or surface water storage will be predicated on compliance with all environmental review and permitting requirements, and maintaining balanced implementation of all Program elements. CALFED will undertake an annual review (see the third paragraph of Section 3.7 for more information about this review) to assess progress toward balanced implementation of the Program.

Subject to these conditions, new groundwater and surface water storage will be developed and constructed, together with aggressive implementation of water conservation, recycling, an improved water transfer market, and habitat restoration, as appropriate to meet CALFED Program goals. During Stage 1, through the Water Management Strategy (including the Integrated Storage Investigation) CALFED will continue to evaluate surface water and groundwater storage; identify acceptable site-specific projects; and initiate permitting, NEPA and CEQA documentation, and construction—if all conditions are satisfied.

The total volume of new or expanded surface water and groundwater storage evaluated by CALFED ranges up to 6 million acre feet, and facility locations being considered are located in the Sacramento and San Joaquin Valleys and in the Delta. A list of sites for further consideration is included in the Phase II Report.

Conveyance

The preferred program alternative employs a through-Delta approach to conveyance. Modifications in Delta conveyance will result in improved water supply reliability, protection and improvement of Delta water quality, improvements in ecosystem health, and reduced risk of supply disruption due to catastrophic breaching of Delta levees. The proposed through-Delta conveyance facility actions include:

- Construction of a new screened intake at Clifton Court Forebay with protective screening criteria.

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- Construction of either a new screened diversion at Tracy with protective screening criteria; and/or an expansion of the new diversion at Clifton Court Forebay to meet the Tracy Pumping Plant export capacity.
 - Implementation of the Joint Point of Diversion for the SWP and CVP, and construction of interties.
 - Construction of an operable barrier at the head of Old River to improve conditions for salmon migrating up and down the San Joaquin River.
 - Construction of operable barriers taking into account fisheries, water quality and water stage needs in the south Delta.
 - Operational changes to the SWP operating rules to allow export pumping up to the current physical capacity of the SWP export facilities.

Under the Preferred Program Alternative, north Delta improvements include:

- Studying and evaluating a screened diversion facility on the Sacramento River with a range of diversion capacities up to 4,000 cfs as a measure to improve drinking water quality in the event that the Water Quality Program measures do not result in continuous improvements toward CALFED drinking water goals.

The diversion facility on the Sacramento River likely would include a fish screen, pumps, and a channel between the Sacramento and Mokelumne Rivers. The diversion facility on the Sacramento River is an action to be considered only after three separate assessments are satisfactorily completed: first, a thorough assessment of Delta Cross Channel (DCC) operation strategies and confirmation of continued concern over water quality impacts from DCC operations; second, a thorough evaluation of the technical viability of a diversion facility; and third, satisfactory resolution of the fisheries concerns about a diversion facility. The assessments of the Delta Cross Channel and the diversion facility on the Sacramento River will be completed simultaneously. The results of all three of these evaluations will be shared with the Delta Drinking Water Council or its successor and the expert panel evaluating fish impacts of Delta conveyance. If these evaluations demonstrate that a diversion facility on the Sacramento River is necessary to address drinking water quality concerns and can be constructed without adversely affecting fish populations, the facility will be constructed as a part of the Preferred Program Alternative.

- Construct new setback levees, dredge and/or improve existing levees along the channels of the lower Mokelumne River system from Interstate 5 downstream to the San Joaquin River.

The Preferred Program Alternative includes a process for determining the conditions under which any future additional conveyance facilities or water management actions would be taken. The process would include:

- An evaluation of how water suppliers can best provide a level of public health protection equivalent to Delta source water quality of 50 parts per billion (ppb) bromide and 3 parts per million (ppm) TOC.
- An evaluation based on two independent expert panels' reports -- one on the Program's progress toward these measurable water quality goals and the second on CALFED's progress toward ecosystem restoration objectives, with particular emphasis on fisheries recovery.

3.8 The CALFED Program and Related Actions

The Preferred Program Alternative is broad, ambitious, and long-term, but by itself does not fully describe the resource management activities of CALFED agencies. Each of the State and Federal CALFED agencies listed in Chapter 1 has responsibilities and authorities that are outside of, but complementary to, the CALFED Bay-Delta Program. No description of comprehensive resource management activities in California is complete without mention of the complementary actions being planned and carried out by State and Federal agencies. This section provides a perspective of how the CALFED Program will be implemented in the broader context of statewide resource management.

3.8.1 Complementary Actions

The actions described in the CALFED Program will be implemented in a solution area that includes most of the state. Individual CALFED agencies have responsibilities and authorities both within and outside the CALFED solution area. Within the defined CALFED solution area, individual CALFED agencies will implement actions that are part of CALFED's preferred program alternative as well as actions that are not part of the CALFED Program. Many of these actions will be complementary to the CALFED Program, and will help to achieve CALFED goals and objectives. Many of these complementary actions are not included in the CALFED Program because they were already underway when the CALFED effort was started in 1995. In these cases, CALFED programmatic actions have been designed to complement or supplement these existing actions and programs.

Other actions will continue to be developed by individual CALFED agencies over time. These new actions and programs will be outside the programmatic analysis of impacts that CALFED has prepared. These new actions will require more extensive environmental review than CALFED actions because impact analysis of new actions will not be able to tier from the CALFED programmatic analysis.

Some examples of these complementary actions will help to illustrate the relationship of CALFED actions and complementary actions of the CALFED agencies.

Comprehensive Study In response to extensive flooding and damages experienced in 1997, the United States Congress authorized the U.S. Army Corps of Engineers to provide a comprehensive analysis of the Sacramento and San Joaquin River basin flood management system and to partner with the State of California to develop a plan for flood management into the 21st century. The Corps and the Reclamation Board of the State of California are leading a Comprehensive Study to improve flood management and integrate ecosystem restoration in the Sacramento and San Joaquin River basins.

The Comprehensive Study will develop master plans that will increase flood protection and improve the ecosystem on major rivers and tributaries in the Central Valley. These plans will include an implementation strategy that will allow immediate execution of improvements to the system. Because this study is the first system-wide evaluation of the flood management systems in the Central Valley, it represents a change in how projects are identified, selected and implemented. It will look at the program from a system-wide perspective as opposed to site-specific projects.

The CALFED Ecosystem Restoration Program also has a system-wide perspective, so the ERP and the Comprehensive Study lend themselves to coordinated implementation. The result can be implementation of actions that provide multiple benefits, meeting ERP goals and objectives while at the same time managing the risk of catastrophic flooding in the Sacramento-San Joaquin system. The Comprehensive Study is not yet completed so no actions have been selected for implementation. However, several CALFED actions stand out as possibilities for coordinated implementation to meet multiple objectives. These include completion of a Sacramento River meander corridor, restoration of flood plain processes on Deer Creek (an east side tributary that enters the Sacramento river near Corning) and floodplain restoration on the lower San Joaquin River.

Anadromous Fish Restoration Program The Central Valley Project Improvement Act was enacted by Congress in 1992. Two CALFED agencies, the U. S. Fish and Wildlife Service and the U. S. Bureau of Reclamation, are jointly responsible for carrying out the CVPIA. The Act includes provisions to restore anadromous fish populations, improve and facilitate water transfers, implement water conservation actions, provide water for wildlife refuges in the Central Valley, and improve flows on the Trinity River for anadromous fish. Many of the CVPIA provisions parallel elements of the CALFED program. The Ecosystem Restoration Program, Water Transfers program, Water Use Efficiency Program, and water project operations for Stage 1 would complement programs with similar goals under the CVPIA.

One provision of the Act directs the implementation of a program which makes all reasonable efforts to ensure that, by 2002, natural production of anadromous fish in Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during the period of 1967-1991. To achieve this goal, the CVPIA Anadromous Fish Restoration Program, or AFRP, will carry out instream and Delta habitat and flow improvements. The flow improvements were based upon information developed by the U. S. Fish and Wildlife Service in 1996. CALFED has incorporated these flow improvement targets into its Ecosystem Restoration Program. Both the AFRP and the CALFED ERP will make water acquisitions, and the two programs will coordinate water acquisitions to provide increased instream flows in specific stream reaches during specific periods to improve habitat conditions.

Facilitation of Water Transfers In addition to CALFED actions related to water transfers, one important complementary action will be an effort to remove a potential barrier to water transfers.

CALFED agencies recognize that a potential barrier to an effective water transfer market is the lack of incentive for some individual landowners to implement agricultural water conservation technologies as a result of water savings frequently accruing to the irrigation district or water supply agency, not to the landowner. In conjunction with USBR and SWRCB, DWR will develop and support proposals that work within California's existing system of water rights to remove this disincentive where needed. DWR will work with water supply agencies and end users to find consensus solutions.

San Luis Bypass One important complementary action in the San Francisco Bay Area is a bypass canal to the San Felipe Unit at the San Luis Reservoir. When operated in conjunction with local storage, this canal would allow Santa Clara Valley Water District to receive water directly from the Delta pumping facilities, thereby avoiding water quality problems associated with the "low point" water levels in San Luis Reservoir.

Bay Area Blending/Exchange A programmatic action with the potential to improve water quality for many urban users is a Bay Area Blending/Exchange project. It would enable Bay Area water districts to work cooperatively to address water quality and supply reliability concerns on a consensual basis. Water supply agencies in the Bay Area have different water sources and different water supply and water quality concerns. This is an "umbrella" project that will evaluate a range of potential changes to existing infrastructure and institutional arrangements to encourage a regional approach to water supply operations. An example is the possibility of building "interconnects" between agency supply aqueducts, so that water suppliers can take advantage of different sources when water quality is highest (e.g., existing and/or additional Sierra sources). Depending on specific local actions selected, a Bay Area Blending/Exchange project might or might not be able to tier off of CALFED's Programmatic EIS/EIR.

Land Retirement A complementary action in the Westside San Joaquin Valley will be voluntary land retirement programs carried out by USBR as part of the CVPIA.

Regional Exchanges Another complementary action would facilitate water quality exchanges and similar programs to make high quality Sierra water in the eastern San Joaquin Valley available to urban Southern California interests. The Metropolitan Water District of Southern California and the Friant Water Users Authority and its member agencies have commenced preliminary discussions to accomplish these objectives, as well as improving water supply reliability for the agricultural districts. CALFED will work to assure that these efforts are consistent with overall programs to restore the upper San Joaquin River and maintain water quality for downstream users.

3.8.2 A Single Blueprint for Ecosystem Restoration

The relationship between the ERP and other plans and regulatory actions affecting restoration, species recovery, and habitat conservation for species dependent on the Delta is a critical issue affecting the potential success of the CALFED Program. How the ERP is implemented over time relative to other restoration and species recovery actions affecting species dependent on the Delta will strongly influence support for, and thus the ultimate success of, the ERP, and the CALFED program as a whole.

The establishment of a single blueprint for ecosystem restoration and species recovery in the Bay-Delta System is a key ingredient for a successful and effective restoration program. A blueprint is the vehicle for ensuring coordination and integration -- not only within the CALFED Program, but among all resource management, conservation, and regulatory actions affecting the Bay-Delta System, including those described above.

With this approach in mind, CALFED has developed a single blueprint framework for development and implementation of the Ecosystem Restoration Program (ERP). This single blueprint is a unified and cooperative approach defined by three primary elements:

- integrated, shared science and a set of clearly explained ecological conceptual models to provide a common basis of understanding about how the ecosystem works;
- a shared vision for a restored ecosystem ; and
- a management framework, which defines how parties with management and regulatory authorities affecting the Delta will interact and how management and regulatory decisions (including planning, prioritization, and implementation) will be coordinated and integrated over time.

The integrated science and ecological conceptual models provide a common basis of understanding about how the ecosystem works. These elements, which would include competing hypotheses and models, represent the foundation for transparent decision making based upon sound science. This is not to imply that these models are fixed, as they will be tested and modified over time in response to new information in accordance with the principles of adaptive management as part of the CALFED Science Program. Rather, the models represent a basis for guiding management and regulatory decisions at a given point in time. They also provide the rationales for these decisions.

The shared vision for ecological restoration serves to define the desired outcome. While each of the management and regulatory programs have their own distinct set of objectives, establishing a unified approach requires that in meeting these objectives the various programs also contribute to meeting common objectives with respect to ecosystem restoration. The objectives for ecological

restoration and species conservation established in the ERP and MSCS provide a broad set of objectives that can provide the common vision for the single blueprint concept.

The management framework defines how parties will interact and how management and regulatory decisions will be coordinated and integrated over time. The management framework is designed to foster coordinated and consistent decision making over time. This management framework must be flexible, incorporating and responding to new information and changing Bay-Delta conditions. The framework must be designed to promote coordinated planning, prioritization, and implementation. It must also incorporate provisions for resolving management and regulatory conflicts that may arise. A separate appendix to the Programmatic EIR/EIS, the *Strategic Plan for Ecosystem Restoration*, provides a general proposed management framework for promoting integration and the concept of a single blueprint approach. (The management framework for the single blueprint is one of several structures/agreements needed to ensure implementation of a new governance structure and decision-making process. The CALFED Governance Plan is further described in Chapter 4 of the Implementation Plan.)

Integration with Related Programs

This single blueprint will be shared not only by the CALFED agencies carrying out ecosystem restoration, but also by all related CALFED programs including Water Quality, Water Use Efficiency, and Levee Restoration. For example, many of the actions in the Water Quality Program are staged to provide improvements and insights critical to the Ecosystem Restoration Program. Likewise, the ERP has located and staged many of its actions to complement the Water Quality Program. This approach also facilitates the development of scientific monitoring and research efforts that can strengthen adaptive management decisions across all CALFED programs, not only the ERP.

Water management decisions for the ERP will be made and carried out in close coordination with overall CALFED water operations in the Bay-Delta system and its tributaries. Through the ERP Water Acquisition Program, implementation of flow actions and water acquisition for the ERP will be carried out in concert with the overall CALFED water management strategy, and most directly with operation of the Environmental Water Account. In this way, restoration actions and operations will be integrated to the extent possible to simultaneously maximize the flows in the system for environmental benefit while preserving the stability of the water supply for all other uses.

Since the integrity of the levee system in the Delta is a critical ingredient in restoring the diversity of estuarine habitats in the Delta, as well as preserving water quality for urban and agricultural uses, the restoration actions being developed in the North and South Delta and upper reaches of the Bay will be developed in close coordination with both the CALFED Levee

Program and all other complementary programs, including the Comprehensive Flood Management Study.

The Watershed Program will play a key role in implementing the CALFED blueprint at the regional level. Through the Watershed Program, local watershed organizations will be better coordinated and engaged in the planning and implementation of the CALFED Program. In the lower watershed, the focus will be on ecosystem restoration and water quality actions. In the upper watershed, the immediate focus will be on partnership projects with local entities to improve water quality and habitat, decrease erosion, and increase base flows in the tributaries to the Delta.

Key related programs and regulatory activities that will be connected through the single blueprint include those listed below. Authority and responsibility for each program or activity will continue to reside with the designated entity; coordination and integration will be improved under the single blueprint concept.

CALFED Related Programs

- Central Valley Project Improvement Act
- Central Valley Joint Venture
- Sacramento River Conservation Area (SB 1086, Upper Sacramento River Fisheries and Riparian habitat Management Plan)
- The Sacramento and San Joaquin Basins Comprehensive Study
- Endangered Species Act (ESA) Recovery Plans
- San Joaquin River Management Plan
- Prop. 12 Program, including flood corridor protection program, river parkways program, non-point source pollution program, watershed protection program and the flood protection program

Regulatory Activities

- Reclamation Board permitting
- ESA biological opinions relating to water project operations, in-channel activities and riparian areas that support species dependent on the Delta
- California Endangered Species Act (CESA) permitting involving species dependent on the Delta
- Water quality regulatory activities (e.g. National Pollutant Discharge Elimination System permitting, Total Maximum Daily Loads, etc.)
- Natural Community Conservation Plans
- Clean Water Act Section 404 and Rivers and Harbors Act permitting
- Federal Energy Regulatory Commission licensing
- Habitat Conservation Plans

4. PROGRAM IMPLEMENTATION

Phase II of the CALFED Bay-Delta Program will culminate with the Federal Record of Decision and the State Certification of the Final Programmatic EIS/EIR (expected to be completed in September 2000). At that time, Phase III of the CALFED Bay-Delta Program will begin implementation of the Preferred Program Alternative. Phase III is expected to extend 30 years or more.

Program implementation during Phase III will be guided by the Implementation Plan. The plan focuses on the early years of implementation when needed actions are better known but also reflects a long-term vision for continuing implementation over the next several decades. This chapter summarizes the Implementation Plan, and contains the following parts:

- **Stage 1 Actions** - A list of proposed actions for the first seven years of implementation following the Record of Decision and Certification of the EIS/EIR.
- **Governance Plan** - Describes Program implementation functions and recommends an interim and long-term governance structure for CALFED.
- **Financing Plan** - Plan for funding the implementation of the preferred alternative including financing principles, cost allocation and cost sharing considerations, and Program element cost estimates.
- **Restoration Coordination** - Describes early implementation of ecosystem restoration actions. Actions are selected for their benefits to the long-term program regardless of the final configuration of the Preferred Program Alternative.
- **Comprehensive Monitoring, Assessment and Research Program** - Plan for monitoring and research that provides the data and necessary information to evaluate the performance of completed actions for use in supporting the adaptive management of future actions.
- **Adaptive Management** - Plan to use the monitoring and research to adjust future implementation as more is learned about the system and how it responds to restoration efforts.

4.1 Stage 1 Actions

Stage 1 is defined as the seven year period commencing with the final decision on the Programmatic EIS/EIR. Agreement on Stage 1 actions is only one part of the decision for a Preferred Program Alternative, but it is important that these actions achieve balanced benefits and lay a solid foundation for successful implementation of the Program.

The following pages provide more detail on potential actions for Stage 1. To the extent that such actions require additional authorizing legislation, such authorization will be developed and pursued in cooperation with stakeholders. The Stage 1 actions are subject to revision, including modification, deletion, or addition of individual actions, based upon information developed during program implementation; available resources, including funding and personnel; and logistical considerations.

The outcome of, and certain sites for, Stage 1 decisions will not be known until additional information, including analysis of alternatives and need for mitigation, is available and until the options to carry out these Stage 1 proposals have undergone environmental review. Consequently, the outcome could be altered as a result of that second tier environmental review and mitigation measures imposed as a part of those actions. However, where the impacts from the actions in Stage 1 have been included in the Programmatic EIS/EIR, the subsequent environmental documents can tie off the Programmatic document for cumulative and long-range impacts of the programmatic decision.

Each potential action in the following Stage 1 list includes an estimate (in parentheses) of when the action may occur within Stage 1. For example, "(yr 1)" indicates the action is expected to occur in the first year following the final decision on the Programmatic EIS/EIR.

With extensive input from CALFED agencies and stakeholders, CALFED has begun work on developing a linked set of high priority Stage 1 actions that provide regional and programmatic balance, as described below. Linking the actions would help assure that they all move forward together. These may be linked within the same project EIS/EIR, tied by contractual documents, bond language, appropriation legislation, or other means.

The State and Federal fish and wildlife agencies charged with making the programmatic determinations for the CALFED Program pursuant to federal ESA, CESA, and the NCCPA will be describing program performance measures or milestones for the Ecosystem Restoration Program (ERP) and MSCS. The milestones will be derived from the ERP targets and programmatic actions and MSCS conservation measures. These milestones will be an integral component of the federal biological opinions and NCCPA authorization.

Levees

The focus of the long-term levee protection element of the Program is to reduce the risk to land use and associated economic activities, water supply, infrastructure, and the ecosystem from catastrophic breaching of Delta levees. The Levees program includes the Delta and Suisun Marsh. The level of flood protection to be provided by Suisun Marsh levees will be defined

during Stage 1. Levee protection is an ongoing effort which builds on the successes of ongoing programs and consists of:

- *Base-level funding to participating local agencies;*
- *Funding of special improvement projects for habitat and levee stabilization to augment the base-level funding based on statewide benefits;*
- *Implementation of subsidence control measures to improve levee integrity;*
- *Implementation of an emergency management and response plan to more effectively plan for and deal with potential levee disasters; and*
- *Development of a risk assessment and implementation of a risk management strategy.*

The first stage continues the decades-long process to improve reliability of Delta levees.

1. Initiate the Levee Program Coordination Group. Develop and implement an outreach, coordination, and partnering program with local landowners including individuals, cities, counties, reclamation districts, resource conservation districts, water authorities, irrigation districts, farm bureaus, other interest groups, and the general public to assure participation in planning, design, implementation, and management of levee projects (yr 1).
2. Obtain short-term federal and State funding authority as a bridge between the existing Delta Flood Protection Authority (AB 360) and long-term levee funding (yr 1-5).
3. Obtain long-term federal and state funding authority (yr 1-7).
4. Conduct project level environmental documentation and obtain appropriate permits for each bundle of Stage 1 actions (yr 1-7).
5. Implement demonstration projects for levee designs, construction techniques, sources of material, reuse of dredged material, and maintenance techniques that maximize ecosystem benefits while still protecting lands behind levees. Give priority to those levee projects which include both short (i.e., construction) and long-term (i.e., maintenance and design) ecosystem benefits, and which will provide increased information (yr 1-7).
6. Adaptively coordinate Delta levee improvements with ecosystem improvements by incorporating successful techniques for restoring, enhancing, or protecting ecosystem values developed by levee habitat demonstration projects or ecosystem restoration projects into levee projects. Continue to develop techniques as major levee projects are implemented (yr 1-7).
7. Fund levee improvements up to PL84-99 in first stage; e.g., proportionally distribute available funds to entities making application for cost sharing of Delta levee improvements (yr 1-7).

8. Further improve levees which have significant statewide benefits in Stage 1; e.g., statewide benefits to water quality, highways, etc. (yr 1-7).
9. Coordinate Delta levee improvements with Stage 1 water conveyance, water quality improvements, and with potential conveyance improvements in subsequent stages (yr 1-7).
10. Enhance existing emergency response plans; e.g., establish a revolving fund, refine command and control protocol, stockpile flood fighting supplies, establish standardized contracts for flood fighting and recovery operations, outline environmental considerations during emergencies (yr 1-7).
11. Implement current Best Management Practices (BMPs) to correct subsidence effects on levees. Assist CALFED Science Program activities to quantify the effect and extent of inner-island subsidence and its linkages to all CALFED objectives (yr 1-7).
12. Develop BMPs for the reuse of dredge materials (yr 1).
13. Institute a program for using Bay and Delta dredge material to repair Delta levees and restore Delta habitat (yr 1-7).
14. Complete total risk assessment for Delta levees and develop and begin implementation of risk management options as appropriate to mitigate potential consequences (yr 1-7).
15. Complete the evaluation of the best method for addressing the Suisun Marsh levee system and begin implementation (yr 1-2).

Water Quality

The water quality program will consist of a wide variety of actions to provide good water quality for environmental, agricultural, drinking water, industrial, and recreational beneficial uses of water. Water quality actions are a combination of source protection and improvement measures, pilot facilities for treatment and control, operational measures using existing and new storage, research and studies, water exchanges, and conveyance improvements. The majority of the water quality actions rely on comprehensive monitoring, assessment, and research to improve understanding of effective water quality management and on the control of water quality problems at their sources. The Stage 1 water quality efforts focus on reducing constituents contributing toxicity to the ecosystem and affecting water users; reducing total organic carbon (TOC) loading, salinity, nutrients, and pathogens that degrade drinking water quality, and reducing oxygen depleting substances and sediment loads that degrade ecological water and habitat quality. CALFED is pursuing Stage 1 actions to protect public health through continuous improvements in drinking water quality. The Stage 1 actions also include studies and investigations that will contribute to an assessment and decision on the need for additional conveyance actions and/or other means of providing better quality source water.

General Water Quality Actions

1. Prepare project level environmental documentation and permitting as needed (yr 1-7).
2. Coordinate with other CALFED program elements to ensure that in-Delta modifications maximize potential for Delta water quality improvements (yr 1-7).
3. Continue to clarify use of and fine-tune water quality performance targets and goals (yr 1-7).

Environmental Water Quality

4. Conduct the following mercury evaluation and abatement work:

Cache Creek

- Support risk appraisal and advisory for human health impacts of mercury (yr 1-5).
- Support development and implementation of total maximum daily loads (TMDL) for mercury (yr 1-7).
- Determine bioaccumulation effects in creek and Delta (yr 1-4).
- Source, transport, inventory, mapping, and speciation of mercury (yr 1-7).
- Information Management/Public Outreach (yr 5-7).
- Participate in Stage 1 remediation (drainage control) of mercury mines as appropriate (yr 1-5).
- Investigate sources of high levels of bioavailable mercury (yr 4-7).

Sacramento River

- Investigate sources of high levels of bioavailable mercury, inventory, map, and refine other models (yr 1-5).
- Participate in remedial activities (yr 3-5).

Delta

- Research methylization (part of bioaccumulation) process in Delta (yr 1-2).
- Determine sediment mercury concentration in areas that would be dredged during levee maintenance or conveyance work (yr 1-7).
- Determine potential impact of ecosystem restoration work on methyl mercury levels in lower and higher trophic level organisms (yr 1-5).

5. Conduct the following pesticide work:

- Support development and implementation of a TMDL for diazinon (yr 1-7).
- Support development of BMPs for dormant spray and household uses (yr 1-3).
- Study the ecological significance of pesticide discharges (yr 1-3).
- Support implementation of BMPs (yr 2-7).

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- Monitor to determine effectiveness of BMP implementation (yr 4-7).
 6. Conduct the following trace metals work:
 - Determine spatial and temporal extent of metal pollution (yr 3-7).
 - Determine ecological significance and extent of copper contamination (yr 2-4).
 - Review impacts of other metals such as cadmium, zinc, and chromium (yr 1).
 - Participate in Brake Pad Partnership (as a stakeholder) to reduce introduction of copper (yr 1-7).
 - Partner with municipalities on evaluation and implementation of storm water control facilities (yr 2-5).
 - Participate in remediation of mine sites as part of local watershed restoration and Delta restoration (yr 2-7).
 7. Conduct the following selenium work:
 - Conduct selenium research to fill data gaps in order to refine regulatory goals of source control actions; determine bioavailability of selenium under several scenarios (yr 1-5).
 - Evaluate and, if appropriate, implement real-time management of selenium discharges (yr 1-7).
 - Expand and implement source control, treatment, and reuse programs (yr 1-7).
 - Coordinate with other programs; e. g., recommendations of San Joaquin Valley Drainage Implementation Program, Central Valley Project Improvement Act (CVPIA) for retirement of lands with drainage problems that are not subject to correction in other ways; Central Valley Regional Water Quality Control Board (RWQCB) water quality actions (selenium TMDL); and Grasslands Bypass project (yr 1-7).
 8. Conduct the following sediment reduction work/organochlorine pesticides:
 - Participate in implementation of U. S. Department of Agriculture (USDA) sediment reduction program (Organochlorine pesticides are also reduced as they are tightly bound with sediment.) (yr 1-7).
 - Promote sediment reduction in construction areas and urban stormwater, and other specific sites (yr 1-7).
 - Implement stream restoration and revegetation work (yr 4-7).
 - Quantify and determine ecological impacts of sediments in target watersheds, implement corrective actions (yr 4-7).
 - Coordinate with ERP on sediment needs (yr 1-3).
 9. Conduct the following work addressing dissolved oxygen (DO) and oxygen depleting substances (including nutrients):
 - Define corrective measures for DO sag (yr 1-7).

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- Encourage regulatory activity to reduce nutrients discharged by unpermitted dischargers (yr 1-7).
 - Develop inter-substrate DO testing in conjunction with ERP (yr 2-4).
 - Study nutrient effects on beneficial uses (yr 4-7).
 - Develop, implement, and support measures to reduce pollutant (oxygen depleting substances, nutrients, and ammonia) discharges from concentrated animal feeding operations (yr 1-7).
 - Support finalization of investigation of methods to reduce constituent that cause low DO for inclusion in the TMDL recommendation by the Central Valley RWQCB (yr 1-2).
 - Support finalization of Basin Plan Amendment and TMDL for constituents that cause low DO in the San Joaquin River (yr 2).
 - Support implementation of appropriate source and other controls as recommended in the TMDL (yr 3).
10. Conduct the following toxicity of unknown origin work:
- Participate in identifying toxicity of unknown origin and addressing as appropriate (yr 1-7).

Drinking Water Quality Actions

11. Actions specific to drinking water improvements:
- Work cooperatively with Bay Area water suppliers as they develop a Bay Area Blending/Exchange Project (yr 1-7).
 - Address drainage problems in the San Joaquin Valley to improve downstream water quality (yr 1-7+).
 - Implement source controls in the Delta and its tributaries (yr 1-7+).
 - Support the ongoing efforts of the Delta Drinking Water Council (yr 1-7+).
 - Facilitate water quality exchanges and similar programs to make high quality Sierra water in the eastern San Joaquin Valley available to urban Southern California interests (yr 1-7).
 - Invest in Treatment Technology Demonstrations (yr 1-7).
 - Control runoff into the California Aqueduct and other similar conveyances (yr 1-7+).
 - Address water quality problems at the North Bay Aqueduct (yr 1-7+).
 - Conduct comprehensive evaluations, pilot programs, and full scale actions to reduce TOC contribution through control of algae, aquatic weeds, agricultural runoff, and watershed improvements (yr 1-7).
 - Improve DO concentrations in the San Joaquin River near Stockton (yr 1-3).

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- Study recirculation of export water to reduce salinity and improve DO in the San Joaquin River. If feasible, and consistent with ERP goals and objectives, implement a pilot program (yr 1-4).

Ecosystem Restoration

The CALFED ERP is designed to maintain, improve, and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species. The ERP is also designed to achieve recovery of listed species dependent on the Delta and Suisun Bay as identified in the MSCS, and support the recovery of listed species in San Francisco Bay and in the watershed above the estuary. A foundation of this program element is the restoration of ecological processes associated with stream flow, stream channels, watersheds, and flood plains. Implementation of the ERP over the 30 year implementation period will be guided through an ecosystem-based, adaptive management approach. ERP goals and objectives for ecosystem, habitat, and species rehabilitation are designed to produce measurable and progressive improvements to the Bay-Delta ecosystem resulting in a high level of ecosystem health and species recovery that exceeds existing regulatory requirements. The Stage 1 restoration efforts are structured to accomplish significant improvement in Bay-Delta ecological health through a large scale adaptive management approach in which the actions inform management decisions in later stages of implementation. All Stage 1 actions will undergo an appropriate level of environmental review, will be subject to various permit requirements, and will be dependent on budget allocations.

Success of ERP Stage 1 actions is also critically dependent on other program elements, including water quality improvement actions throughout the Bay-Delta watershed, levee system integrity actions, and integration with a watershed management strategy and a water transfers market. To ensure success, CALFED will be facilitating the development of a single blueprint or coordinated plan for environmental restoration throughout the CALFED focus area. The general priorities for restoration activities will be first on existing public lands as appropriate, second to work with landowners in volunteer efforts to achieve habitat goals including the acquisition of easements, third a combination of fee and easement acquisition, and fourth on acquisition of fee title as necessary to achieve program objectives. Acquisition will be on a willing seller basis and with emphasis on local coordination and partnerships and include appropriate mitigation for agricultural resource impacts. The intent is to maximize habitat benefits while minimizing land use impacts.

1. Develop and implement an outreach, coordination, and partnering program with local landowners and individuals, cities, counties, reclamation districts, the Delta Protection Commission, resource conservation districts, water authorities, irrigation districts, farm bureaus, other interest groups, and the general public to

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- assure participation in planning design, implementation, and management of ecosystem restoration projects (yr 1-7).
2. Conduct project level environmental documentation and permitting as needed for each Stage 1 action (yr 1-7).
 3. Full coordination and funding partnerships with other ongoing activities which address ecosystem restoration in the Bay-Delta system; e. g., CVPIA, Four Pumps Agreement, Non-native Invasive Species Task Force, etc. (yr 1-7).
 4. Implement habitat restoration in the San Francisco Bay, Sacramento-San Joaquin Delta, Suisun Bay and Marsh, and Yolo Bypass to improve ecological function and facilitate recovery of endangered species consistent with the goals of the ERP Strategic Plan and MSCS (yr 1-7). Habitat restoration efforts in Stage 1 will: restore 2,000 acres of tidal perennial aquatic habitat, restore 200 acres of deep open water nontidal perennial aquatic habitat, restore 300 acres of shallow open water nontidal perennial aquatic habitat, enhance and restore 50 miles of Delta slough habitat, enhance and restore 50 to 200 acres of midchannel islands, restore 8,000 to 12,000 acres of fresh emergent (tidal) wetlands, restore 1,200 to 2,300 acres of saline emergent (tidal) wetlands, restore 4,000 acres of fresh emergent (non-tidal) wetlands, restore 25 miles of riparian and riverine aquatic habitat, restore 1,000 to 2,000 acres of perennial grassland, restore 7,000 to 10,000 acres of seasonal wetlands, and establish 8,000 to 12,000 acres of wildlife friendly agricultural habitat. Focus early restoration on the Yolo Bypass, Mokelumne/Cosumnes, and San Joaquin habitat corridors. This reflects approximately one-fourth of the acreage identified in the ERP to be restored during the 30-year implementation period. These actions are key to making progress towards achieving the goals in the ERP and the MSCS. Consistent with the CALFED solution principle to reduce conflicts in the system and ERP Goal # 1, *At-Risk Species*, highest priority will be placed on actions that restore populations of at-risk species that most strongly affect the operations of the SWP/CVP diversions in the south Delta. The results of these actions will begin to inform the adaptive management process and will help guide larger scale habitat restoration in future stages.
 5. Implement large-scale, restoration projects on select rivers (possibly Clear Creek, Deer Creek, and the Tuolumne River) that would include implementation of all long-term restoration measures in coordination with the watershed management common program and monitoring of subsequent ecosystem responses to learn information necessary for making decisions about implementing similar restorations in later stages (yr 1-7).
 6. Implement an Environmental Water Account (EWA) that acquires water for critical ecosystem and species recovery needs, substantially through voluntary purchases in the water transfer market in its first few years and developing additional assets over time (yr 1-4).

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7. Pursue full implementation of ERP upstream flow targets through voluntary purchases of at least 100,000 acre-feet by the end of Stage 1. Evaluate how the ERP water acquisitions and EWA water acquisitions will be integrated most effectively (yr 1-7).
 8. Complete targeted research and scientific evaluations needed to resolve the high priority issues and the twelve uncertainties identified in the ERP Strategic Plan (e.g., instream flow, exotic organisms, and Bay Delta food web dynamics) to provide direction for implementing the adaptive management process and information necessary for making critical decisions in later stages (yr 1-7).
 9. Establish partnerships with universities for focused research (yr 1-7).
 10. Complete the remaining 60% of the easements and/or acquisition for the Sacramento River meander corridor identified under the SB 1086 Program (yr 1-7). Provide assurances for and participation by Sacramento River users and landowners that provides indemnification of affected parties against flooding impacts on neighboring landowners and impacts on water diverters.
 11. Acquire flood plain easements, consistent with ecosystem and flood control needs along the San Joaquin River in coordination with the Corps' Sacramento and San Joaquin River Basins Comprehensive Study (yr 4-7).
 12. Continue high priority actions that reduce direct mortality to fishes (yr 1-7):
 - Aggressively screen existing unscreened or poorly screened diversions in the Delta, on the Sacramento River, San Joaquin River, and tributary streams based on a systematic priority approach.
 - Remove select physical barriers to fish passage.
 13. Continue gravel management; e.g., isolate gravel pits on San Joaquin River tributaries and relocate gravel operations on Sacramento River tributaries (yr 1-7). Most gravel work would be implemented in subsequent stages with designs and plans for ecosystem reclamation of gravel mining sites.
 14. Begin implementing the CALFED comprehensive non-native (exotic) invasive species prevention, control, and eradication plan including the following (yr 1-7):
 - Implement invasive plant management program in Cache Creek.
 - Develop ballast water management program.
 - Develop early-response invasive organism control programs.
 - Evaluate CALFED implementation actions and how those actions may benefit non-native species to the detriment of native species or the Bay-Delta ecosystem.
 15. Provide incremental improvements in ecosystem values throughout the Bay-Delta system in addition to habitat corridors described above; e.g., pursue actions that are opportunity-based (willing sellers, funding, permitting, etc.), provide incremental improvements on private land through incentives, develop partnerships with farmers on "environmentally friendly" agricultural practices, etc. (yr 1-7).

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16. Incorporate ecosystem improvements with levee associated subsidence reversal plans (yr 1-7).
 17. Evaluate the feasibility of harvest management to protect weaker stocks (yr 1-7).
 18. Implement projects on selected streams to provide additional upstream fishery habitat by removing or modifying barriers, see also discussion of Fish Migration Barrier Removals in Section 2.7 - Storage (yr 1-7).
 19. Working with the CALFED agencies, assist in the preparation of detailed, ecosystem-based restoration and recovery plans for any priority species identified in the ERP Strategic Plan and the MSCS for which up-to-date plans are not available. Begin implementing appropriate additional restoration actions identified in these plans (yr 1-7).
 20. In coordination with South Delta Improvements (Conveyance), identify and advance specific regional ERP goals (yr 1-7).

Water Use Efficiency

The CALFED water use efficiency (WUE) element is designed to accelerate the implementation of cost-effective actions to conserve and recycle water throughout the State in order to increase water supplies available for beneficial uses. The major components of the program are: 1) support ongoing urban and agricultural sector processes for certifying and endorsing local agency implementation of cost-effective efficiency measures; 2) provide technical and planning assistance to local agencies and districts developing and implementing WUE measures; and 3) institute a competitive grant/loan incentive program to encourage WUE investments in the urban and agricultural sectors.

1. Expand Existing State and Federal Agricultural Water Conservation Programs to Support On Farm and District Efforts - Expand State and federal programs (Department of Water Resources [DWR], U. S. Bureau of Reclamation [USBR], U. S. Fish and Wildlife Service [USFWS], Department of Fish and Game [DFG], Department of Health Services [DHS], Natural Resources Conservation Service [NRCS], and SWRCB) to provide technical and planning assistance to local agencies and districts in support of local and regional conservation and recycling programs (yr 1-7).
2. Expand Existing State and Federal Conservation Programs to Support Urban Water Purveyor Efforts - Expand State and federal programs (DWR, USBR, USFWS, DFG, DHS, and SWRCB) to provide technical and planning assistance in support of conservation and recycling programs (yr 1-7).
3. Agricultural Water Management Council (AWMC) Evaluation of Agricultural Water Management Plans - Utilize the AB 3616 AWMC to evaluate and endorse plans to implement cost-effective water management practices by agricultural

- districts. Identify and secure ongoing funding sources for AWMC and its members seeking to actively participate in the development, review, and implementation of these plans (yr 1-7).
4. Develop Urban Water Management Plan Certification Process - Select an agency to act as certifying entity, obtain legislative authority, carry out public process to prepare regulations, and implement program (yr 1-3).
 5. Implement Urban BMP Certification Process - Implement a process for certification of water suppliers' compliance with terms of the Urban MOU with respect to analysis and implementation of BMP's for urban water conservation. Provide funding support for the California Urban Water Conservation Council (CUWCC) to carry out this function (yr 1-7).
 6. Prepare a program implementation plan, including a proposed organizational structure consistent with the overall CALFED governance structure, for an competitive grant/loan incentive program for WUE (yr 1). This will include:
 - Incentives in the agricultural sector that will consider several factors, including: (i) potential for reducing irrecoverable water losses; (ii) potential for attaining environmental and/or water quality benefits from WUE measures which result in reduced diversions; (iii) regional variation in water management options and opportunities; (iv) availability and cost of alternative water supplies; and (v) whether the recipient area experiences recurrent water shortages due to regulatory or hydrological restrictions. Many of these factors are included in the Quantifiable Objectives for Agricultural Water Use Efficiency, and as such, the Quantifiable Objectives will be an important component of the agricultural incentive criteria.
 - Incentives in the urban sector will assist in identifying and implementing urban water conservation measures that are supplemental to BMP's in the Urban MOU process and are cost effective from a statewide perspective.
 - Incentives for water recycling in the urban and agricultural areas.
 - The plan will include annual reporting and evaluation mechanisms to gauge effectiveness of the program.
 7. Refuge Water Management - Finalize and implement the methodology for refuge water management which was described in the June 1998 "Interagency Coordinated Program for Wetland Water Use Plan, Central Valley, California" (yr 1-3).
 8. Research effort to establish appropriate reference conditions for evaluating program progress, and to identify improved methods for WUE (yr 1-7).
 9. Assess the Need for Additional Water Rights Protections - After consultation with CALFED agencies, the Legislature, and stakeholders, evaluate the need for additional state regulations or legislation providing protection for water rights

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- holders who have implemented WUE measures and subsequently transferred water to other beneficial uses (yr 1-4).
10. Water Measurement - Develop, after consultation with CALFED agencies, the Legislature, and stakeholders, state legislation that requires appropriate measurement of water use for all water users in California (yr 1-3).
 11. Create Public Advisory Committee - Within the context of the broader CALFED public involvement plans, create a public advisory committee to advise State and Federal agencies on structure and implementation of assistance programs, and to coordinate State, federal, regional and local efforts for maximum effectiveness of program expenditures (yr 1).

Water Transfer Framework

The water transfer framework is designed to facilitate, encourage, and streamline the water transfer process while protecting water rights and legal users of water and addressing and avoiding or mitigating third-party socioeconomic impacts and local groundwater or environmental impacts. This would occur through a proposed framework of actions, policies and processes. The first stage implements the recommended changes which will continue in subsequent stages.

1. Develop an Interactive Water Transfer Information Web-site - CALFED agencies will develop, implement, and maintain an interactive, publicly available web-site called On Tap (yr 1-7). This site will serve as an interim and long-term interface to stakeholders and the public with respect to CALFED water transfer actions including: 1) streamlining the approval process, 2) defining transferrable water, 3) providing public disclosure of proposed transfers, and 4) facilitating the sharing of water transfer related data, research, and assessment methodology. The web-site will initially be designed to include:
 - an on-line transfer application process that will provide proponents with information regarding who has approval authority (USBR, SWRCB, DWR), what must be provided to the responsible agency, and what criteria the agency will use during the review period;
 - a searchable database of all approved transfers (going back to the late 1980's and adding new transfers as they are approved); and
 - information regarding other CALFED Water Transfer Program actions.Initial aspects of this web-site will be publicly available in the first year after signing of the Programmatic ROD.

Improve Information Sharing:

2. Establish the California Water Transfers Information Clearinghouse to operate and maintain the On Tap web site, collect and disseminate data and information relating to water transfers and potential transfer impacts, and perform research using historic data to understand water transfer impacts (yr 1-7).
3. Coordinate with CALFED agencies to require water transfer applicants to provide additional impact assessment information as allowed under existing law (yr 1-4).
4. CALFED agencies will identify, arrange, fund, and carry out a specific number of targeted water transfers for in-stream environmental purposes as part of the ERP, with a goal of using these transfers to evaluate the effectiveness of and make any necessary improvements to California Water Code Section 1707 procedures and tracking protocols (yr 1-3).
5. As part of the WMS, a groundwater assistance program (discussed more explicitly under Storage tools) will be established to fund studies to gather groundwater data and to enable local entities to develop and implement local groundwater management/monitoring programs (yr 1-2).

Lower Transaction Costs Through Permit Streamlining:

6. Development by CALFED agencies of a streamlined water transfer approval process including "pre-certification" of certain classes of transfers and expedited environmental review procedures (yr 1-6).
7. CALFED agencies work with stakeholder representatives to clarify and define what water is deemed transferrable under what conditions (yr 1-3).
8. CALFED agencies continue to work with stakeholder representatives to resolve conflicts over carriage water criteria (yr 1-3).
9. Establish a refill criteria policy for reservoir storage based water transfers (yr 1).

Increase the Availability of Existing Facilities for Water Transfers:

10. Begin forecast and disclosure process of potential conveyance capacity in existing export facilities (DWR and USBR). This would be an on-going activity, occurring in conjunction with hydrologic forecasts (yr 1-7).
11. CALFED agencies will work with stakeholders to develop an agreed upon set of criteria and procedures governing the determination of transport system availability and costs, including the procedures to determine the fair reimbursement to the water conveyance facility operator (yr 1-3).

Watershed Program

The Watershed Program will promote collaboration and integration among existing and future local watershed programs and provide technical assistance and funding for watershed activities that support the goals and objectives of the CALFED Bay-Delta Program. The actions during Stage 1 are a mix of watershed coordination, restoration, maintenance, and conservation activities, as well as demonstration projects designed to illustrate the benefits of watershed management to the Bay-Delta system while also benefitting existing watershed resources.

1. Fund and implement community based watershed restoration, maintenance, conservation, and monitoring activities that support the goals and objectives of the CALFED Program (yr 1-7).
2. Assist local watershed groups and government agencies to address common issues, including roles and responsibilities, funding support, technical assistance, information exchange, and to ensure effective communication and implementation among government agencies and stakeholder groups (yr 1-7).
3. Implement a funding process and provide watershed stewardship funds to build the capacity of community based programs to carry out comprehensive long-term watershed management (yr 1-7).
4. Improve the use and usefulness of existing or future watershed information management functions to provide data and other information to people involved in watershed management (yr 3-7).
5. Ensure the completion of project level environmental documentation and permitting; assist with documentation and permitting processes as appropriate (yr 1-7).
6. Evaluate the benefits (including economics) that accrue from watershed plans and projects designed to achieve CALFED goals and objectives (yr 3-7).
7. Establish, fund, and maintain watershed restoration and maintenance assistance to aid local watershed groups and private landowners in project concept, design, and implementation (yr 1-7).
8. Collaborate with other CALFED and non-CALFED programs on watershed related activities (yr 1-7).
9. Provide appropriate information and assistance to stakeholders and the Legislature to develop a state-wide umbrella watershed management act (yr 1).

Storage

Groundwater and surface water storage can be used to improve water supply reliability, provide water for the environment at times when it is needed most, provide flows timed to maintain water quality, and protect levees through coordinated operations with existing flood control reservoirs.

New groundwater and surface storage will be developed as appropriate to meet CALFED program goals as part of a comprehensive WMS that includes aggressive implementation of water conservation, recycling, an improved water transfers market, and habitat restoration. Decision to construct groundwater or surface storage will be predicated on maintaining balanced implementation of all Program elements and compliance with all environmental review and permitting requirements.

During Stage 1, CALFED intends to take the necessary steps to pursue expansion of two existing reservoirs and construction of a new off-stream reservoir, with a total capacity of 950 thousand-acre-feet (TAF) and a major expansion of groundwater storage for an additional 500 TAF to 1 million-acre-feet (MAF). In addition, CALFED will study two potential reservoir locations through partnerships with local agencies. These projects are described in the Phase II Report. CALFED will continue to evaluate these surface and groundwater storage opportunities, initiate permitting, NEPA and CEQA documentation, and construction - if all conditions are satisfied. These efforts will be coordinated under CALFED's Integrated Storage Investigation (ISI).

In addition, CALFED will continue work to refine and periodically update the WMS. ISI studies will evaluate the utility of specific storage projects in providing water quality, water supply reliability, and ecosystem benefits. This information, together with information gained from implementation of other CALFED Program elements and updated information on California's changing water management needs, will be considered in an Evaluation Framework. This Framework will include: 1) a comprehensive hierarchy of objectives for the CALFED Program; 2) well-defined measures of performance associated with the achievement of objectives; and 3) provide a basis for comparison of alternative long-term water management strategies. The Evaluation Framework will provide a structure for periodically updating the WMS and determining appropriate levels of the future investment in various water management tools.

Groundwater Banking and Conjunctive Use - *Develop locally managed and controlled groundwater and conjunctive use projects with a total of 500 TAF to 1 MAF of additional storage. This effort includes developing cooperative partnerships with local agencies and landowners in both the north-of-Delta and south-of-Delta areas, and includes construction of several south-of-Delta projects. Additional south-of-Delta and north-of-Delta projects, if feasible, could be constructed in later stages.*

1. Finalize agreements with new local project proponents for joint planning and development (yr 1).
2. Begin feasibility studies (yr 1).
3. Report on the performance of feasibility studies, implementable projects, and potential benefits and beneficiaries (yr 3).
4. Implement early stages of the most promising projects (yr 1-5).
5. Aggressively pursue implementation of additional project (yr 1-7).

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6. Support legislation that supports groundwater management by local agencies at the sub-basin level.

Surface Storage - CALFED agencies identified a list of twelve potential surface storage projects that are in varying stages of the environmental review or feasibility process. Actions taken in Stage 1 will focus on completing the necessary studies to implement or proceed with five surface storage projects:

1. In-Delta storage project (approximately 250 TAF) - An in-Delta storage facility can provide both fishery benefits and enhances water project flexibility. CALFED will explore the lease or purchase of the Delta Wetlands project. CALFED also will initiate a new project, in the event that Delta Wetlands proves cost prohibitive or infeasible (Planning: yr 1-2, Construction: yr 3-7).
2. Expand CVP storage in Shasta Lake by approximately 300 TAF - Such an expansion will increase the pool of cold water available to maintain lower Sacramento River temperatures needed by certain fish and provide other water management benefits (Planning: yr 1-4, Construction yr 6-7).
3. Expand Los Vaqueros Reservoir by up to 400 TAF with local partners as part of a Bay Area water quality and water supply reliability initiative - As part of a Bay Area initiative, an expanded Los Vaqueros Reservoir would provide water quality and water supply reliability benefits to Bay Area users. As an existing reservoir operated by the Contra Costa Water District (CCWD), the Los Vaqueros Reservoir is subject to a number of mandates and agreements, CALFED intends to work with CCWD and interested stakeholders to assure that previous commitments, including local voter approval required for expansion, are respected (Planning: yr 1-5, Construction yr 6-7).
4. Sites Reservoir - Construction of Sites Reservoir, with a project capacity of up to 1.9 MAF, could enhance water management flexibility in the Sacramento Valley. By reducing water diversion on the Sacramento River during critical fish migration periods, this project can greatly increase reliability of supplies for a significant portion of the Sacramento Valley. It can also provide storage and operational benefits for other CALFED programs including Delta water quality and the EWA. CALFED will join local partners to evaluate this project in Stage 1 (yr 1-5). Extensive technical work, significant environmental review, and development of cost-sharing agreements must be completed before a decision to implement this project as part of the CALFED Program can be made.
5. Additional storage in the upper San Joaquin River watershed - Additional storage capacity of between 250-700 TAF would be designed to contribute to restoration of and improved water quality for the San Joaquin River and facilitate conjunctive water management and water exchanges that improve the quality of water deliveries to urban communities. Additional storage could come from

enlargement of Millerton Lake at Friant Dam or a functionally equivalent storage program in the region. CALFED will join local partners to evaluate this project in Stage 1 (yr 1-6). Extensive technical work, significant environmental review, and development of cost-sharing agreements must be completed before a decision to implement this project as part of the CALFED Program can be made.

Power Facilities Reoperation Evaluation - *There is the potential to reoperate some hydroelectric facilities to produce water supply or ecosystem benefits. The following actions will be taken in the context of the ISI.*

1. Identify beneficiaries and negotiate cost sharing agreements (yr 1-7).
2. Work with CALFED agencies, the Public Utilities Commission, the SWRCB, the Federal Energy Regulatory Commission, and interested stakeholders to identify reoperation opportunities (yr 1-2)
3. Develop environmental documentation (yr 3-5).
4. Perform feasibility studies and economic analyses (yr 3-5).
5. Obtain permits, negotiate operating agreements, and seek site specific authorization as required (may require design of facilities modifications to accommodate new operational priorities) (yr 5-7).
6. Begin construction (if needed) and begin new operations if conditions and linkages are satisfied (yr 6-7).

Fish Migration Barrier Removal Evaluations - *As part of the ERP some obstructions to fish passage such as small dams are being considered for modification or removal in order to restore anadromous fish access to critical spawning habitat. The following actions will be taken in the context of the ISI:*

1. Work with CALFED agencies, the SWRCB, local water agencies, and interested stakeholders to identify opportunities for modification or removal of obstructions such as small dams (yr 1-2).
2. Develop environmental documentation (yr 3-5).
3. Perform feasibility studies and economic analyses (yr 3-5).
4. Obtain permits, negotiate agreements, and seek site specific authorization as required (may require design of facilities modifications or removal actions) (yr 5-7).
5. Identify beneficiaries and negotiate cost sharing agreements (yr 5-7).
6. Begin construction (if needed) and begin new operations if conditions and linkages are satisfied (yr 6-7).

Conveyance

CALFED's basic strategy is to develop a through-Delta conveyance alternative based on existing Delta configuration with some modifications. Some construction of improvements in the south and north Delta should occur within the first stage to improve conditions for ecosystem and water management reliability. Part of the first stage consists of site-specific environmental review and permitting. This will allow conveyance projects to be ready for construction in later stages should the projects be necessary to meet Program objectives.

South Delta Improvements - *South Delta Improvements consist of methods to control flow, stage and circulation, improve fish passage, fish screen and salvage facilities, and potentially provide SWP/CVP interties upstream and downstream of the export pumps. South Delta conveyance improvements included in Stage 1 would function with the basic through-Delta conveyance strategy or potential modifications. The conveyance improvement actions listed below would be implemented concurrently with other South Delta Improvements, Stage 1 actions, and components of the other CALFED Program elements.*

1. Construct and evaluate a 500 cubic feet per second (cfs) test facility at the Tracy Pumping Plant to develop best available technology for fish screening and salvage for the intakes to the SWP and CVP export facilities (yr 1-7).
2. Construct a new screened intake for Clifton Court Forebay for the full export capacity of the SWP (yr 1-7+).
3. Implement Joint Point of Diversion for the SWP and CVP (yr 1-7).
4. Evaluate and decide on whether to retain a separate CVP intake facility or to consolidate with the SWP facility. Also evaluate and potentially implement an intertie between the project canals downstream of the export pumps (yr 1-7).
5. Increase SWP pumping by 500 cfs from July through September (yr 1-4).
6. Facilitate SWP export flexibility up to 8,500 cfs with appropriate constraints (yr 1-3).
7. Obtain permits to use full SWP capacity of 10,300 cfs for operational flexibility, consistent with all applicable operational constraints, for water supply and environmental benefits (yr 1-7+).
8. Dredge and install operable barriers to ensure water of adequate quantity and quality is available for diversion to beneficial uses within the south Delta (yr 1-7). For the purposes of the project level environmental analysis for the South Delta Improvements, various operable barrier configuration alternatives or their functional equivalents will be evaluated including the installation of a permanent fish migration barrier at the Head of Old River and construction of three permanent flow control structures at Old River at Tracy, Middle River upstream of Victoria Canal, and Grant Line Canal. The Grant Line Canal would be constructed and operated in accordance with conditions and directions

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- specified by USFWS, National Marine Fisheries Service (NMFS), and DFG. All temporary barriers installations will be phased out as soon as feasible.
9. Form a Barrier Operations Coordination Team, consisting of USFWS, NMFS, DFG, DWR, USBR, and stakeholder representatives to operate the barriers (yr 1-7).
 10. Monitor barrier effects on fish, stages, circulation, and water quality (yr 1-7).
 11. Dredging of selected channel segments to limit scour velocities and for water supply availability, navigation, and flood control (yr 3-7).

North Delta Improvements - *Provide a coordinated regional solution to ecosystem, watershed, water quality, water supply reliability, and flood control concerns in the North Delta Region. North Delta improvements consist of methods to address flood control, water quality, fisheries, and water supply reliability concerns. Actions include modification of the Delta Cross Channel operational criteria, channel dredging and/or setback levees in the Mokelumne River, and creation of additional flood plain, wildlife, and fisheries habitat. A screened diversion on the Sacramento River will be evaluated and may be implemented if necessary.*

1. Evaluate and implement improved operational procedures for the Delta Cross Channel to address fishery and water quality concerns (yr 1-4).
2. Simultaneously evaluate a screened through-Delta facility with a diversion capacity of up to 4,000 cfs on the Sacramento River. This evaluation would consider the effectiveness of water quality measures and how to operate the Delta Cross Channel in conjunction with this new diversion structure to improve drinking water quality, while maintaining fish recovery (yr 1-4).
3. Complete environmental review of recommended Delta Cross Channel operational procedures and the screened diversion evaluations. If the environmental review demonstrates that this diversion facility is needed to improve water quality in the Delta and at the export facilities, and can be constructed and operated without adverse effects to anadromous and estuarine fish, construction will begin late in Stage 1. This diversion would likely include a fish screen, pumps, and a channel between the Sacramento and Mokelumne Rivers. The historic emphasis has been on a screened diversion at Hood on the Sacramento River. This and other potential sites will be considered as part of this evaluation (yr 4-7).
4. Evaluate opportunities to resolve local flood concerns and create tidal wetlands and riparian habitats by constructing new setback levees, improving existing levees, and dredging channels in the north Delta, especially the channels of the lower Mokelumne River system. Any proposed channel modification would be consistent with CALFED's current direction on Delta conveyance. This evaluation would carefully coordinate ecosystem restoration, regional flood control, levee system integrity, and conveyance issues and concerns to ensure that a balanced solution to all concerns would be proposed (yr 1-7).

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5. Facilitate region-wide coordination of all CALFED related projects in the north Delta region (yr 1-7).

Additional Conveyance Actions - *A process for determining the conditions under which any additional conveyance facilities and/or other water management actions would be taken in the future would include:*

1. An evaluation of how water suppliers can best provide a level of public health protection equivalent to Delta source water quality of 50 parts per billion (ppb) bromide and 3 parts per million (ppm) TOC (yr 1-7). This will include an equivalent level of investigation and studies on all of the actions which could be used to achieve CALFED's targets.
2. An evaluation based on two independent expert panels' reports: one on CALFED's progress toward these measurable water quality goals and the second on CALFED's progress toward ecosystem restoration objectives, with particular emphasis on fisheries recovery (yr 6-7).
3. Additional environmental review. Construction of an isolated facility component of a dual Delta conveyance is not an element of the CALFED Preferred Program Alternative. A decision to construct such a facility would require separate environmental review and alternatives analysis that has not been done as part of the CALFED programmatic analysis.

Governance Arrangements

After the ROD, CALFED will begin the implementation phase of the Program. The CALFED agencies are proposing the creation of a joint state and federal commission to oversee and direct the CALFED Program in the long-term. A new commission will require State and federal legislation. In the interim, until a new commission is established, the CALFED agencies will use the Policy Group governance structure. A new Interim Governance Agreement will be developed and executed, which describes the interim governance structure and decision-making process.

1. Implement the interim governance structure and decision-making process at the time of the ROD. The interim structure and functions will continue until the long-term structure is in place.
2. Establish CALFED Independent Science Board, establish EWA independent science panel, establish other independent science panels as needed.
3. Form public advisory council to advise the new commission or Policy Group.
4. Initiate actions to implement the long-term governance structure for CALFED. New federal and state legislation will be needed to clarify/modify existing agency

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- authorities and to establish a new joint federal-state commission for program oversight and implementation.
5. Establish the new commission: implement administrative, fiscal, personnel changes to form the commission.

Finance

The Financing Plan contains the initial framework for developing a strategy for funding the Preferred Program Alternative (including total costs for implementation/improvements, mitigation, and ongoing annual operating and maintenance costs). Proposed funding sources would include a combination of federal, state, private, and user funds. Financing will be needed over several decades as the various parts of the Preferred Program Alternative are selected, implemented, operated, and maintained. The Financing Plan includes financial principles incorporating a benefits-based approach, a discussion of historical cost-sharing, cost-allocation procedures, proposed cost-sharing scenarios, cost estimates for Stage 1 of Program Implementation, and a preliminary identification of classes of beneficiaries for each of the Program elements. The Plan recognizes the public and user benefits derived from water quality, environmental protection, flood control, recreation, and a reliable water supply.

1. Establish reliable short-term and long-term funding for each program element and for each package of Stage 1 actions (1-7):
 - Finalize cost-share agreements (yr 1-2).
 - Finalize details surrounding repayment or crediting (yr 1-2).
 - Seek legislation and budget authority for financing, including federal and state appropriations, new authority for state bonds, private financing, and new user fees (yr 1-7).
 - Work with local interests to develop state legislation to create a user fee that will generate reliable funding for program elements with broad public benefits, such as the Ecosystem Restoration Program (yr 1-2).
 - Develop and refine cost estimates as program actions are identified (yr 1-7).
 - Prepare a cross-cut budget on an annual basis showing the funding of related state and federal programs and incorporate into finance strategies and funding requests (yr 1-7).

Science Program

As part of the Science Program, establish monitoring, data assessment, and research activities for all program elements which provide information for evaluating the effectiveness of the

program actions in reaching the program objectives. All the monitoring, data assessment, and research activities will be done within an adaptive management framework. Consequently, most of the activities will be undergoing continual refinement through the duration of the program. The program will be designed to examine 30 year trends within which, components will be tailored to examine the short term time step of the 1-7 year Phase III, Stage 1 Program.

1. Periodic review and refinement of the monitoring, data assessment, and research plan from a long term perspective (yr 1-7+).
2. Periodic review and refinement of the monitoring, data assessment, and research plan from a short-term perspective which would include all elements of the Phase III, Stage 1 Program (yr 1-7+).
3. Help management define triggers and time periods which determine the need for a change in program direction (yr 1-7+).
4. Continue to develop and refine conceptual models to be used in evaluating actions undertaken by the programs. In keeping with the adaptive management format, the models will be continually updated (yr 1-7+).
5. Through a peer review process, evaluate the validity of the data evaluation and the application of the evaluation by the program decision making process (yr 1-7+).
6. Review the progress towards achieving overall CALFED program goals and objectives (yr 1-7+).
7. Complete monitoring identified by diversion-effects-on-fisheries team to provide feedback on actual diversion effects of south Delta pumps (yr 2-7).
8. Design long-term, system wide, baseline monitoring with focused research to increase understanding of ecological processes and ways to reduce uncertainty; definition of needed studies is currently under development, the following are examples:
 - Conduct focused research on Delta hydrodynamics and linkage to food web including relation to location of diversion point.
 - Study population trends of fish using the Delta, including fish salvage at south Delta export facilities, with emphasis on San Joaquin River fall run chinook salmon, delta smelt, and Mokelumne River fall run chinook salmon and steelhead trout.
 - Expand real-time monitoring for enhanced fish protections and flexible operations for water suppliers.
9. Provide available data on need to reduce bromides, total dissolved solids, TOC, pesticides, and trace metals (yr 5).
10. Provide available data on water quality in south Delta and lower San Joaquin River (yr 1-7).
11. Monitor and assess the impacts of WUE measures on water demands and available supplies, and develop better information for water balances in the Bay-Delta system (yr 1-7).

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12. Prepare annual reports on status and progress, including such information as: performance of habitat restoration actions compared to expected results, summaries of any new information on the relative importance of various stressors, and any need for adjustments in actions or conceptual models (yr 1-7).
 13. Analyze status and need for adjustments of actions for later stages (yr 5-7).
 14. Monitor and report land use changes, such as agricultural land conversion, resulting from CALFED actions (yr 2-7).
 15. Hire an interim science leader and subsequently hire a chief scientist (yr 1-2).
 16. Appoint an Independent Science Board and an independent science panel for the EWA (yr 1-2).
 17. Coordinate existing monitoring and scientific research programs (yr 1-7).
 18. Refine the set of ecological, operational, and other predictive models which will be used in the evaluative process (yr 1-2).
 19. Establish and refine performance measures and indicators for each of the program areas (yr 1-7).

Regulatory Compliance

1. For each action in the program, ensure that the appropriate environmental documents are prepared, tiering off the Programmatic EIS/EIR, and that all necessary permits are obtained (yr 1-7).
2. For each action in the program, ensure compliance with applicable or relevant and appropriate requirements (yr 1-7).
3. Tiering from the MSCS, begin to develop the project specific restoration, avoidance, minimization, and compensation measures necessary to recover MSCS covered species and to prevent additional listings in the Delta (yr 1-7).
4. Implement a CALFED environmental documentation, mitigation, and permit coordination process (yr 1-7).

4.2 Governance Plan

The governance and decision-making structure for implementation of the CALFED Preferred Alternative is a key feature in assuring successful program implementation. The CALFED agencies have developed a proposal for long-term governance of the CALFED Program. The State and Federal administrations strongly believe that a new joint Federal-State commission must be created through State and Federal legislation to oversee long-term implementation. This approach will require resolution of Federal Constitutional concerns. In the near-term the CALFED agencies will rely on an interim governance structure similar to the current voluntary

structure to bridge the gap before appropriate legislation can be completed establishing a permanent structure.

Schedule for Governance Decisions and Implementation

- Interim Governance
 - New Implementation MOU adopted by the time of the ROD.
 - Operates until a long-term governance structure adopted
- Long-Term Governance
 - Proposal in Final EIS/EIR
 - Legislation needed to finalize
 - Expect long term governance in place in 2-3 years (2002- 2003)

The *Implementation Plan* volume of the *Final Programmatic EIS/EIR* contains the Governance Plan. The Governance Plan includes a description of the governance functions necessary for implementation, a proposal for long-term governance, and an interim governance structure until the permanent structure is in place. A summary of the Governance Plan is provided below.

Program Functions for Implementation Phase

As CALFED moves into program implementation (Phase III) from the planning phase, new responsibilities and functions will be required. Before proposing a governance structure suitable for program implementation, CALFED first identified the basic functions that will need to be performed in Phase III. CALFED has organized functions for implementation of the program into three categories to accommodate the complexity of the program; program direction, program management, and direct implementation.

5. Program Direction and Oversight Functions.

- Oversight of CALFED Program Implementation. Develop policies and make decisions in order to achieve program goals and objectives, make decisions at program milestones (staged decision-making), and provide direction to ensure balanced implementation, integration, and continuous improvement in all program areas.

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- Program Assessment and Modification. Assess overall achievement of program goals and objectives, and modification, as needed, of program goals and objectives. Modification would be done in coordination with the appropriate agencies and with public input.
 - Review and Approve Priorities and Budgets. Review and approval of program priorities and budgets in all program areas.
 - Coordination and Integration of Related Programs. Coordinate, and if appropriate integrate, CALFED Program with other related programs to maximize available resources and reduce conflicts and inconsistencies with other programs. Programs would need to be identified within the State and Federal agencies that are most related to CALFED objectives to determine what level of coordination and integration those programs should have with CALFED.
 - Conflict/Dispute Resolution. Facilitate resolution of conflicts/disputes between CALFED agencies.
 - Public Outreach and Communication. Provide for public input and communication for the CALFED Program as a whole.
 - Legislative Communication. Communicate with Congress and the California Legislature; report on program progress; answer legislative inquiries; review and respond to legislative proposals; and to review and submit legislative proposals.

2. Program Management Functions.

- Manage program implementation
- Identify priorities, propose actions, develop budgets
- Assess and report on program area performance
- Coordinate with implementing agencies and stakeholders, and between program areas

3. Direct Implementation Functions. These functions have been identified separately because some agencies which may be involved in CALFED program implementation may not have program management responsibility. For example, one entity will be responsible for program management of the ERP (Bay-Delta Program in the interim), but there will be many agencies and organizations responsible for direct implementation of ERP actions. Direct implementation functions include:

- Responsibility for direct implementation of individual actions.

- Report on assessment and monitoring of individual actions
- Prepare environmental documentation and obtain permits
- Stakeholder and local coordination for individual actions

Interim CALFED Governance

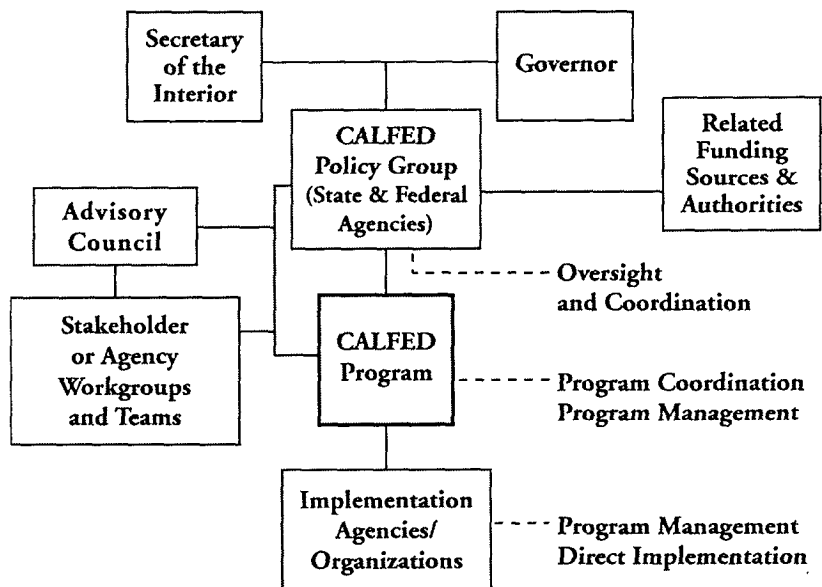
The interim structure will be in place from the time of the ROD until a long-term permanent structure is adopted through State and Federal legislation. For interim governance, CALFED proposes adoption of the current CALFED structure being used during the planning stage, but adapted for implementation. The interim governance structure, including identification of how decisions will be made, will be set forth in a new Implementation MOU which the agencies will develop and execute by the time of the ROD. The current structure is made up of the Policy Group reporting to the Governor and Secretary of the Interior, public advisory groups, the Bay-Delta Program Executive Director and staff, and State and Federal agencies and teams. This structure, with additions and modifications, will serve to bridge the gap until a permanent commission is established.

Interim Implementation Functions and

Responsibilities. Described below is a general description of responsibilities and functions for interim implementation of the Preferred Alternative.

Policy Group and CALFED Bay-Delta Program. In the interim, the program direction functions will continue to be performed by the CALFED Policy Group with support by the CALFED Bay-Delta Program staff. Bay-Delta Program staff will provide program direction and coordination for priorities, workplans, and budgets developed by State and Federal agencies participating in CALFED implementation.

CALFED Interim Governance Structure and Functions



Program priorities, workplans and budget requests for "Primary" CALFED Programs (those programs targeted at CALFED objectives) should be reviewed by the CALFED Policy Group. While final approvals will continue to rest with the agencies with program and funding authority, Policy Group will provide recommended approvals to the funding agency. This review and coordination is critical in the interim to ensure programs and funding are meeting CALFED objectives.

Public Involvement. In the interim, public involvement in the implementation of the Program will be through public advisory groups and through public Policy Group meetings. A broad public advisory group will be formed to meet jointly with Policy Group and separately as needed. Public involvement will continue to be provided through groups focused on individual program areas, such as the Drinking Water Council, the Ecosystem Roundtable, and other workgroups. In addition, regional advisory groups may be established. Other options for structuring public involvement in the interim are being evaluated.

Funding. As CALFED implementation begins, it is critical that the program demonstrates progress in meeting its objectives and demonstrates an integrated program. Although State and Federal agencies that are members of the CALFED Policy Group are in strong support of a coordinated program, it will be a challenge to oversee and coordinate a fragmented program in which all funding and program authority rests in numerous agencies. In the interim, CALFED Policy Group and Bay-Delta Program staff will provide funding coordination and integration among the many agencies. This will be especially necessary with regard to "Primary" CALFED Programs--those programs and funding targeted at CALFED objectives. Program priorities, workplans, and budget requests for primary CALFED programs should be coordinated with the Bay-Delta Program staff and reviewed by the CALFED Policy Group. While final approvals will continue to rest with the agencies with program and funding authority, Policy Group will provide recommended approvals to the funding agency. CALFED agencies will define the primary CALFED programs and funding in the Implementation MOU by the time of the ROD. Specifically, Bay-Delta Program staff will coordinate with State and Federal agencies on budget requests, workplans, and priorities.

Interim Program Management. Program management functions for each program area will in most cases be performed by State and Federal agencies which currently have program and funding authorities. With program management responsibilities distributed among many agencies, it is important that agencies closely coordinate to achieve the CALFED objectives. For several programs such as the ecosystem restoration, watershed, and drinking water quality programs, the Bay-Delta Program will be assigned the program management responsibilities in order to reduce fragmentation among existing agencies. In all cases, however, CALFED agencies will retain and exercise their statutory authorities. The term "program management" does not suggest any delegation of an agency's authority to the Bay-Delta Program.

Long-term Governance Proposal

CALFED strongly believes that a new public agency needs to be created to oversee the long-term implementation of the CALFED Preferred Alternative. The CALFED agencies support legislation to create a joint Federal-State commission. This approach will require resolution of Federal Constitutional concerns. The legislative charge to the new Commission should be to provide program direction and oversight of the program. The commission would be assisted by an advisory committee whose members would include qualified representatives from Indian tribes and stakeholder groups. A joint commission made-up of high-level appointees would maintain visibility inside and outside the government, assure agency coordination, help secure funding, and provide policy leadership. The CALFED agencies propose a 12 member commission made up of equal numbers of high level officials of the Federal and State agencies responsible for implementing CALFED programs and a similar number of high level stakeholder and tribal representatives.

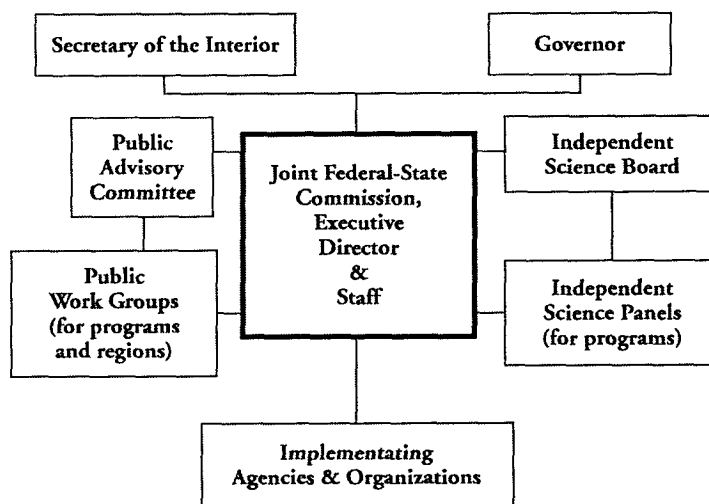
This proposal for a new commission embodies an integrated approach to water and environmental management in the Bay-Delta system that requires a shift in authorities and management of these critical resources. CALFED has adopted the following principles that summarize the essential elements of the governance proposal.

Principle 1: Federal/State Partnership. *The CALFED Program, as defined in the final PEIS/R and accompanying documents, should be carried out through a State and Federal government partnership.*

Principle 2: Accountability. *There should be a clear point of, and process of accountability of the Program to the Legislature, the Congress, and the public.*

Principle 3: Commission. *A new commission should be created to provide direction and oversight of the Program to achieve CALFED Bay-Delta Program goals and objectives.*

CALFED Long-Term Governance Structure



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- Principle 4:** Membership. The membership of the commission should be made up of State, Federal, tribal and public members. Public members should represent a broad array of interested constituencies. State and Federal members should be representatives at the highest level of the agency organization.
- Principle 5:** Leadership. The governing structure and authorities of the commission should be designed to attract effective leadership.
- Principle 6:** Changes in Authorities. The commission will not exercise or supplant any regulatory authorities. However, changes in specified program and funding authorities should be made in legislation to consolidate or coordinate management of each program area.
- Principle 7:** Agency/Tribal Participation. The commission should establish a process to support participation and coordination with agencies (Federal, State, and local) and tribes involved in and affected by the CALFED Program who are not members of the commission. The commission should facilitate government -to-government consultation with the tribes.
- Principle 8:** Public Involvement. The commission's meetings should be open and public, and the commission should seek ways to maximize public knowledge of, and involvement in, its work. The commission should support involvement in the Program at a community-based level.
- Principle 9:** Program Management. Program management for each of the program areas should be specified in legislation establishing the commission. Each program area should be evaluated to determine the appropriate entity for assuming program management functions. Responsibility for program management will vary between program areas depending on the nature of the program and actions, the expertise of agencies, and the ability of the agency to manage the programs without significant conflicting mandates.
- Principle 10:** Comparable Authority over Program areas. Each of the program areas should have the same degree of autonomy from, as well as the same degree of accountability to, the commission. For each program area, the commission should exercise a comparable degree of authority over specified funding and programs.
- Principle 11:** Funding. Funding for implementation of the CALFED Program should be appropriated directly to the commission for those activities assigned to the

commission. For CALFED programs managed by another State or Federal agency, funding for the program should be appropriated directly to that agency, with control language requiring commission review, coordination, and approval of program plans, priorities and implementation.

Principle 12: *Crosscut Budget. For those funds and programs not under Commission approval but which are related to CALFED (to be specified in an interagency MOU), the appropriate agencies should participate in preparing an annual Crosscut Budget to ensure coordination with the CALFED Program.*

Principle 13: *Legislative Reporting. The commission should serve as the focal point for contact on the CALFED Program with Congress and the California Legislature, and should provide annual status reports on the Program.*

4.3 Financing Plan

With the signing of the Record of Decision, CALFED will need to have a financing plan in place to begin implementation. To be prepared for program implementation, a finance plan is needed to guide State and Federal administration and legislative discussions regarding new bonds, new fees, and proposed budget appropriations.

The Financing Plan contained in the *Implementation Plan* volume of the *Final Programmatic EIS/EIR* lays the initial framework for developing a CALFED Finance Plan. The Plan provides background, definitions, description of program benefits, description of possible funding sources, financing options, and issues to resolve to finalize a Finance Plan.

The Financing Plan for implementing the CALFED Bay Delta Program is a critical component of the program because of the assurance needed by CALFED agencies and stakeholders that a serious and concerted effort will be made to secure funding for all components over the life of the program. In developing financial strategies and cost sharing for the many aspects of the CALFED program, CALFED is following several basic steps:

- Identifying the priority actions for implementation
- Developing cost estimates for priority actions
- Identifying the funding and cost sharing formulas in existing laws and agreements

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- Identifying program/project benefits and beneficiaries
 - Identifying finance and cost allocation issues that affect the successful implementation of the program (promoting new technologies, changing attitudes/behaviors, ability to pay problems, characteristics of funding sources limiting program implementation)
 - Lastly, recommending the cost allocation and cost-sharing procedures and strategies for each program element and in some cases for individual projects. These recommendations will likely come during implementation.

Beneficiaries Pay. A fundamental philosophy of the CALFED program is that costs should, to the extent possible, be paid by the beneficiaries of the program actions. The CALFED agencies consider this policy to be equitable, and there are reasons, other than equity and fairness, that the beneficiaries-pay principle be applied to CALFED and other water resources programs. Having beneficiaries pay for public programs encourages them to more carefully review their water and power needs and the costs of proposed programs (including mitigation costs) in relation to the benefits they receive. Such a policy also encourages examination of a fuller range of alternatives, including locally funded measures, in order to assure that public funds are spent in the most cost-effective way to meet program goals.

In the first few years of Implementation, large shares of public funding will be needed to move the Program forward. State and Federal funds may be used not only for program elements with mostly public benefits, but may also be used for program elements that will likely have multiple benefits, including substantial non-public benefits. However, it is expected that beneficiaries will reimburse the public and pay for larger shares of the costs in the latter years of Stage 1. For example, public funds may be used for the planning and evaluation of storage projects to ensure a comprehensive and fair comparison of storage options. However, should a storage project proceed to construction, then the public funds used for planning and evaluation will be reimbursed by the project beneficiaries.

Historical Financing. CALFED's finance strategy must be considered within the current and historical context of State and Federal water resources financing. Historically, Federal water projects have been financed with appropriations and, in some cases, repayment was provided by beneficiaries at below market rates of interest (or no interest). This resulted in historically low levels of effective cost-sharing. Since the 1980's, Federal water resources agencies have been requiring higher levels of non-Federal cost-sharing, through higher levels of up-front cost sharing and other means. The Central Valley Project Improvement Act of 1992 enacted tiered water rates, Mitigation and Restoration payments, and other fees to be deposited into a Restoration Fund to be used for environmental purposes. Financing for the State Water Project relies principally on general obligation bonds and revenue bonds, with revenue bonds being backed by payments from water and power users which provides large repayment levels.

Program Benefits/Beneficiaries. At this time, because many of the actions have not yet been specified, (e.g. water use efficiency actions, storage sites), the specific benefits cannot be identified or measured, and program costs cannot be allocated to those benefits. In other cases, such as ecosystem restoration, benefits can be identified but not easily measured or assigned to specific beneficiaries. However, to initiate the finance discussions, and lay the framework for a CALFED finance strategy, the Financing Plan identifies expected benefits and beneficiaries at the program level. For actions where benefits can be measured, the program or project costs will be allocated among the measured benefits. For those programs where benefits cannot be reasonably measured (ecosystem, water quality, watershed programs), CALFED will need to identify a procedure or strategy for estimating and allocating costs. After the benefits analysis and cost allocation, CALFED may propose cost shares among beneficiaries that differ from existing State and Federal cost-sharing formulas or may use the cost-sharing formulas in existing programs.

The benefits from each program area (both near-term and expected future benefits), are described in the Financing Plan. In addition, the Financing Plan identifies cost allocation and cost-sharing issues, and potential cost-sharing options. In general, the options differ financially (the extent to which they require higher levels of repayment from beneficiaries), or institutionally (in terms of what mechanism they rely on to secure repayment, ranging from existing programs, up-front cost-sharing, recovery through water rates, or recovery through other user charges). Some of these options address user fees targeted at the beneficiaries of a particular program.

Financing Mechanisms. The Financing Plan compares several different financing mechanisms, all of which have been used to date and are expected to be used in the future, including State and Federal appropriations, State general obligation bonds, State water and power revenue bonds (tied to SWP water and power rates), private financing, user fees and a broad-based Bay-Delta system diversion fee. The advantages and disadvantages of these various funding sources and financing mechanisms are also described in the table below.

CALFED and CALFED stakeholders have discussed the use of a broad-based Bay-Delta system user, particularly to finance some of the programs or actions with public benefits, such as the Ecosystem Restoration Program (such a fee is discussed, for example, in the 1996 report on *Financing Options* produced by the California Business Roundtable, the California Chamber of Commerce, the California Farm Bureau Federation, and the California Manufacturers Association). This user fee would most likely apply to all major diverters of water from tributaries that flow into the Delta, as well as exporters of Delta water. The Financing Plan explores how such a broad-based user fee could be structured and what revenues could be expected for fees similar to those established in the CVPIA. The crediting of CVPIA revenues and other contributions to date would be an integral part of implementing any broad-based user fee.

Potential Funding Sources -- Advantages and Disadvantages		
Option	Advantages	Disadvantages
General obligation bonds	<ul style="list-style-type: none"> --Can achieve substantial up-front funding, but distribute the financial burden over time. --Focuses stakeholders and the public on next program phase. 	<ul style="list-style-type: none"> --Requires legislative and voter approval. --Would require repeated approval over 30-year period. --Cannot be used for ongoing costs such as land management costs, monitoring and assessment
Water and power revenue bonds	<ul style="list-style-type: none"> --Can provide immediate sources of funding if linked to revenue-generating facilities. --Less burden on State budgets than general obligation bonds. Does not require voter or legislative approval. Linking beneficiaries to programs in SWP rates is consistent with beneficiary pay. 	<ul style="list-style-type: none"> --Works well for private benefits (water deliveries and powers), but hasn't been used to cover programs with broad public benefits.
State appropriations	<ul style="list-style-type: none"> --Provides immediate sources of funding. --Focuses stakeholders and the public on next program phase. --Allows annual Legislative review 	<ul style="list-style-type: none"> --A more direct financial burden than bonds. --Competition with other State programs. --Annual approval reduces assurance for long-term funding --Would require repeated approval over 30-year period.
Federal appropriations	<ul style="list-style-type: none"> --Provides immediate sources of funding. --Focuses high-level State and federal attention on the program. --Allows annual Congressional review 	<ul style="list-style-type: none"> --Competition with other federal priorities. --Annual approval reduces assurance for long-term funding. --Would require repeated approval over 30-year period.
Private financing	<ul style="list-style-type: none"> --Can be more immediate than funding from public sources. --Some contributions have been made to solve regional problems, as well as local problems. 	<ul style="list-style-type: none"> --Is generally focused on local needs.
Broad-based user fee	<ul style="list-style-type: none"> --Dependable and ongoing source of revenues (may fit with programs for ongoing funding needs). --Tied to diversion impacts on the Delta. --A broader-based fee would provide consistency and fairness with CVP users, who currently pay such fees. --Supported by stakeholder groups - Business Roundtable, etc. 	<ul style="list-style-type: none"> --Since revenues come in annually, the funding available initially is less than with bonding or appropriations.

Stage 1 Projected Expenditures

CALFED has developed preliminary cost estimates for the Program for Stage 1. These costs are shown in the table below. Stage 1 costs are in current year dollars, and exclude interest, inflation, operation and maintenance, and program management costs. These estimates range in precision from specific project costs for conveyance improvements in the South Delta to broad programmatic level estimates of costs for water use efficiency. Additionally, CALFED's adaptive management approach makes long term cost estimating inherently difficult. However, the Stage 1 cost estimates do represent the right order of magnitude of investment which will be necessary to carry the program forward successfully.

CALFED Stage 1 Projected Expenditures ¹ (\$ in millions)	
Program Area	Total Cost
Ecosystem Restoration ^{2,3}	\$1,326
Water Use Efficiency/Recycling ⁴	\$2,956
Water Transfers ⁵	\$15
Watershed Management	\$300
Environmental Water Quality	\$280
Drinking Water Quality	\$675
Levees ⁶	\$444
Storage ⁷	\$1,425
Conveyance ³	\$747
Science Program ⁸	\$300
TOTAL	\$8,468
Notes: ¹ Preliminary; current year dollars based on staff estimates. Total costs assume contributions from State, Federal, and User/Private funding. ² Funding includes \$50 million per year for the first four years for the Environmental Water Account. ³ Cost estimates differ from Appendix A in "California Water Future: A Framework for Action" (June, 2000) because some actions which were considered complementary to CALFED were included in Appendix A, but are not included in this table. ⁴ Actual expenditures will be determined after ongoing evaluation of effectiveness of program investments during the first four years of Stage 1. ⁵ No major capital investments are necessary for this program. ⁶ Total cost includes funding for the Suisun Marsh Levee Program, which provides substantial ecosystem, water quality, and flood control benefits. ⁷ Storage expenditures include funding for groundwater and surface water planning and construction. ⁸ Science Program will provide for implementation of adaptive management and more cost-effective decision-making throughout the rest of the Program.	

4.4 Early Ecosystem Restoration

The December 15, 1994, Bay-Delta Accord included a commitment to develop and fund non-flow related ecosystem restoration activities to improve the health of the Bay-Delta ecosystem. This funding source and commitment is commonly referred to as Category III. The Category III Steering Committee was formed to administer the first rounds of Category III funding. In 1996, the administration function for Category III funds was shifted to the CALFED Bay-Delta Program's Restoration Coordination Program, which receives input from the Ecosystem Roundtable, the Bay-Delta Advisory Council (BDAC), and the general public. The Bay-Delta Advisory Council consists of over 30 representative California stakeholder groups. BDAC is chartered under the Federal Advisory Committee Act and provides input to the overall CALFED Program. The Ecosystem Roundtable is a subcommittee of BDAC specifically created to provide input from a broad cross-section of stakeholder interests to the Restoration Coordination Program.

To date, CALFED's Ecosystem Restoration Program has received more than 900 proposals and has funded 271 projects for a total of approximately \$250 million. The Program has funded fish screens, fish ladders, land acquisition, habitat restoration, and focused research and monitoring designed to provide information which will improve future restoration efforts. Funding sources have included contributions from the California Urban Water Agencies, Proposition 204 State bond funds, funding from the Federal Bay-Delta Act, and EPA watershed funding. For additional information on projects funded to date, visit the CALFED website at: <http://calfed.ca.gov> under the Ecosystem Restoration topic.

In 1999, the Restoration Coordination Program began the transition from early ecosystem restoration to implementation of the long-term Ecosystem Restoration Program. Once the Final Programmatic EIS/EIR is completed and the CALFED agencies make a decision on the CALFED Preferred Program Alternative, the agencies will begin full implementation of the long-term Ecosystem Restoration Program.

4.5 CALFED Science Program

Introduction

The CALFED Science Program includes implementation of the Comprehensive Monitoring, Assessment and Research Program (CMARP) as an integral aspect of the CALFED Program. The scope of the CALFED Science Program will include all elements of the program: ecosystem restoration, water supply reliability, water use efficiency and conservation, water quality, and levees. The purpose of the CALFED Science Program is to provide new information and scientific interpretations necessary to implement, monitor, and evaluate the success of the

CALFED Program. The CALFED Bay-Delta Program is organized around the concept of adaptive management because there is incomplete knowledge of how the ecosystem functions and the effects of individual project actions on populations and processes. Monitoring key system functions, completing focused research to obtain better understanding, and staging implementation based on information gained are all central to the adaptive management process. Actions are taken based on the best available information; results monitored and research performed in order to refine future actions or investments. This approach is dependent on credible and objective scientific review and evaluation to ensure that decisions are based on the best available, objective information. New information and scientific interpretations will be used to confirm or modify all aspects of the CALFED Science Program, including problem definitions, conceptual models, research, and implementation actions. The process necessarily includes numerous assessment and feedback loops so that management decisions are based on the best and most current information. This process entails an institutional framework to ensure that the correct questions are identified for monitoring and research actions, that monitoring and research are conducted appropriately, that the data collected and obtained are stored properly and available to those with an interest, and that relevant information is developed from the data obtained to further the incremental process of adaptive management.

Although the scope of the CALFED Science Program will address areas of uncertainty in all CALFED program elements, some program elements such as the Ecosystem Restoration Program (ERP) strongly rely on an adaptive management science program. In addition, the information from the CALFED Science Program will be available for use by other related State, Federal, local and nongovernmental actions/programs in the CALFED solution area. This includes other ecosystem restoration, water quality, levee and water management activities both regulatory and nonregulatory, including water project operations.

Status of the CALFED Science Program

A substantial monitoring effort in the Bay and Delta has been carried out for several years through the Interagency Ecological Program (IEP). The purpose of the CALFED Science Program is to build on the work of IEP and other efforts to assure that information gathering and evaluation necessary to the success of the CALFED Program is developed and carried out. The CALFED Science Program will help provide those new facts and scientific interpretations necessary for implementing the CALFED Program and for the public to judge the Program's success. Major efforts will include documenting and explaining the status and trends of the resources, providing timely information for real-time management, and participating in design, execution, and analysis of adaptive experiments. The CALFED Science Program must routinely make available information on major indicators of program progress. The CALFED Science Program efforts must be subjected periodically to independent scientific review to evaluate the Program's relevance and approach and to maintain public confidence in the Program.

The CALFED Science Program has made significant progress in recent years using early implementation of the ERP as its foundation. Agencies and stakeholders have participated in the development of ERP conceptual models, indicators of success, and the use of independent science review. All these ERP activities are critical components of a Science Program. CALFED is now expanding these activities to include the establishment and implementation of a Science Program for all areas of the CALFED Program, and for related activities.

In March 1999 a preliminary CMARP report was prepared and subsequently became a draft technical appendix of the Revised Draft Programmatic EIS/EIR in June 1999. The appendix includes preliminary information that has contributed to the development of a CALFED Science Program. This appendix has not been updated, and does not incorporate additional accomplishments relative to the development of a CALFED Science Program to date. In many cases, information on components and structure of a CALFED Science Program are preliminary and will continue to be refined as the Program moves to implementation.

The scope of the CALFED Science Program includes both institutional and environmental considerations. It seeks to balance specific knowledge needs of water managers and the public versus an understanding of ecosystem processes and what can actually be obtained and measured from the field. For example, CALFED agencies presently monitor the abundance of several key species and environmental attributes such as streamflow at the State and Federal diversion facilities in the Delta to understand better what is entrained, when, how many, during what life stage and under what kind of environmental conditions. Although much of this monitoring is designed to address institutional needs, limits on knowledge obtained are based on limitations of monitoring design which in turn are limited by the physical system to be monitored. Thus, the programmatic scope of the CALFED Science Program must consider both institutional needs and environmental considerations and should maintain sufficient flexibility to respond to both as they change over time.

CALFED has determined that monitoring, assessment, and research efforts are a critical component of the adaptive management process, and should be integral to all program elements. The application of the CALFED Science Program will be very different for individual CALFED programs. However, each program element has similar needs that include gathering and assessing data. In addition, the CALFED Science Program must also address the monitoring and assessment needs of the CALFED Multi Species Conservation Strategy, as well as any mitigation required as a result of CALFED program actions.

The CALFED Science Program will take into consideration the broad variety of factors that can affect the environment, its physical structure, chemical makeup and biotic communities. The recommended program will necessarily be limited to monitoring only a small fraction of the possible physical chemical, and biological, attributes of the environment. Conceptual modeling will play a key role in helping decide which attributes to monitor.

CALFED recognizes the need for reducing uncertainties about the factors affecting the resources of the Bay-Delta system. Although a traditional monitoring, assessment and research program will meet this need over a period of decades, CALFED needs to reduce key uncertainties at a more rapid rate to meet program goals. Therefore, CALFED will undertake an active program of adaptive resource management. Such a program will require a partnership between resources managers and scientists in which effects of key factors are better defined by informed management experiments. Resource managers will thereby increase chances of avoiding catastrophes and responding successfully to unexpected events. Informed adaptive experiments require policy-level recognition and acceptance of some risks to the resources.

In April 2000 the CALFED Management Group appointed a temporary Science Oversight Team (prior to the arrival of an interim science leader) to accomplish a set of tasks for the CALFED Science Program. These tasks include:

- Develop science questions associated with Stage I management decisions,
- Develop functions and structure of the CALFED Science Program,
- Draft revisions of the Programmatic EIS/EIR related to the CALFED Science Program,
- Develop initial lists of indicators and performance measures,
- Assess feasibility of a Bay-Delta science center,
- Develop coordination plans for science programs relevant to CALFED, and
- Clarify issues of implementing adaptive management in CALFED

The Science Oversight Team is currently responsible for overseeing the execution of these tasks in conjunction with other CALFED staff in all Program areas, CALFED agency staff, scientific advisors and stakeholders.

The rest of this section describes science related accomplishments and ongoing tasks, following the same organization as the CMARP Technical Appendix – goals and objectives, conceptual models, monitoring and research, data assessment and reporting, structure and function of the science program, and remaining implementation tasks. Many of these tasks are related to ecosystem restoration activities. It is anticipated that as other programs move into implementation that the CALFED Science Program will be expanded to meet the needs of all Program elements.

Goals and Objectives

Summary tables linking monitoring elements and indicators recommended by the CMARP Appendix to CALFED program objectives have been developed for all CALFED programs. These tables are accessible on the CMARP web page (<http://www iep.ca.gov/cmarp>), and the summary table for the ERP has been used to help create a terrestrial and amphibian baseline monitoring plan. The Science Oversight Team has begun an effort to describe specific scientific investigations and tasks needed to support management decisions by the end of Stage I. This information as it is developed and refined will provide the basis for setting priorities for scientific activities.

Conceptual Models

Many of the appendices of the CMARP appendix on monitoring/research topics contain conceptual models that were foundations for monitoring and research recommendations in Chapter 5 of the CMARP appendix. An additional need arose to develop conceptual models relevant to some of the key ecosystem restoration issues. These issues include fluvial geomorphology, riparian habitat and avifauna, tidal wetlands, aquatic contaminants, open water processes, salmonids, delta smelt, splittail, diversion effects on fish and the Environmental Water Account, and delta agricultural diversions. To meet this need, an ongoing process to document these issue-oriented conceptual models and their implications for restoration actions is being developed in a series of white papers. White paper authors are using the CMARP conceptual models to help develop the issue-oriented conceptual models. This process is described in more detail in the Strategic Plan for Ecosystem Restoration.

In addition, the ERP has begun requiring description and use of conceptual models in all proposed restoration projects (Ecosystem Restoration Projects and Programs, 2001 Proposal Solicitation Package). The models are intended to help project proponents explain the technical basis and assumptions underlying their proposed work, and to formulate testable hypotheses about project consequences.

Monitoring and Research

Activities in this category include work on a) baseline and ERP project monitoring programs, b) drinking water monitoring and research, and c) Stage 1 research questions.

a) Work is under way to identify the baseline monitoring needs for the ERP. The effort has been divided into two areas: aquatic monitoring (includes fish, aquatic invertebrates, hydrodynamics, fish habitat) and terrestrial and amphibian monitoring (includes birds, mammals, reptiles, amphibians, habitats, and the hydrologic and geomorphic processes that affect them). The purpose of these plans is to provide essential information on status and trends of important organisms and

their biological and physical habitats. Preliminary drafts of both of these plans have been assembled and will be available for review during early summer 2000. The terrestrial and amphibian monitoring effort will be conducting workshops with technical experts in summer, 2000 and expects to have a final report drafted by October, 2000. The aquatic monitoring effort expects to have a final report completed at an earlier date.

Protocols are being developed for data collected by ERP projects. These protocols are intended to ensure that project data are adequate to evaluate project performance and are compatible with data from other projects as necessary to evaluate overall program performance relative to baseline monitoring.

b) An organic carbon workshop was held in August 1999 and produced a workshop proceedings (Organic Carbon Drinking Water Quality Workshop Proceedings, CALFED Bay-Delta Program, October 9, 1999). The workshop was organized primarily to explore what is known about organic carbon sources, chemical qualities of the sources, and in-Delta transformations, and to identify monitoring and research needs. Nine speakers gave talks about organic carbon and drinking water issues and then the workshop participants discussed key issues and uncertainties. These proceedings provide useful information on organic carbon and drinking water.

c) The Science Oversight Team, in coordination with CALFED staff, CALFED agency staff and stakeholders is developing a list of Stage I management decisions and corresponding science questions that need to be addressed. As they are developed and refined, the science questions will be compared and reconciled with the recommendations in Chapter 5 of the CMARP appendix. Using these results, the CALFED Science Program will recommend focused research priorities for participating agency science programs and research proposal solicitations. This process also is expected to provide a clear rationale for activities that the Science Program undertakes and a management context in which to report science results.

Data Assessment and Reporting

CALFED is contracting with DWR to add data generated by ERP projects to an existing relational data base and browser system created for the Interagency Ecological Program (IEP), Central Valley Project Improvement Act Comprehensive Assessment Monitoring Program, and the Sacramento River Watershed Program. The project entails adding CALFED monitoring data as it becomes available into the relational data base and providing an already-created "data browser" and mapping interface for querying and displaying the data over the World Wide Web. This system will enable simultaneous queries and retrievals of data from all of these programs while allowing each data provider to retain control of its own data. It is anticipated that as other program elements move into implementation they will also make use of centralized data management.

The CALFED GIS Coordination Workgroup was formed in spring, 1999. CALFED's spatial analysis needs were summarized in a 6-page document based upon the CMARP Appendix and CALFED documents. A draft set of recommendations were prepared for the development of a GIS data layer for vegetation and other land cover within the CALFED Problem and ERP Focus Study areas to meet CALFED's vegetation spatial analysis needs. Some of these recommendations have been included in the Terrestrial and Amphibian Baseline Monitoring Program Report described above.

A CALFED Science Conference will be held on October 3-5, 2000 (see web page announcement at <http://iep.water.ca.gov/calfed/sciconf/>). The conference is being designed as a forum for presenting scientific information and ideas relevant to CALFED's goals and objectives in the San Francisco Bay, Delta, and watershed pertaining to ecosystem restoration, levee system integrity, and water quality. The conference program will feature a mix of plenary and contributed talks and poster presentations on topical themes relevant to CALFED. Conference organizers will write a management-oriented summary of the conference.

An effort was begun in November 1999 to develop an initial set of ecological indicators and performance measures for the ERP. It is anticipated that preliminary indicators and performance measures for all Program areas will be developed and refined as the Program moves into implementation.

Structure and Function of the Science Program

CALFED is seeking an interim science leader to precede a CALFED Chief Scientist. The interim science leader will be responsible for implementing the CALFED science program as a combination of coordinated agency science programs and a proposal solicitation process.

To meet its immediate needs the ERP has established an Interim Science Board (ISB) to provide the ERP with management-oriented scientific advice, review, and guidance. In addition, an Agency-Stakeholder Ecosystem Team (ASET) has been assembled to secure agency and stakeholder technical input. The ISB and ASET will work with CALFED staff and the broader agency/stakeholder community (e.g., the Ecosystem Roundtable) to help ensure that ERP implementation is based on sound science, employs an adaptive management strategy, and integrates with other relevant State and Federal programs. For more details, see the Strategic Plan for Ecosystem Restoration.

The Science Oversight Team in coordination with CALFED staff, CALFED agency staff, scientific advisors and stakeholders has started a process to develop the primary functions of the science program and how the program will be structured to perform its functions. The following describes the initial draft key functions of a CALFED Science Program. Additional information

on the functions and structure of the CALFED Science Program can be found in the governance chapter of the Implementation Plan.

Science Planning and Priorities

Develop broad science priorities to guide monitoring, research, and trial implementation actions. The priorities will support the scientific information needed to make management decisions during or at the end of Stage 1. Priorities and planning will be integrated across program elements, and developed with independent scientific review, agency and stakeholder input, and coordination among program managers. Priorities will be submitted to Policy Group or a CALFED commission for approval. Review and, if necessary, refine science based performance measures and indicators for each program on an ongoing basis to ensure the CALFED Program is effectively measuring and reporting on the program success.

Monitoring

Conduct monitoring to provide information to assess progress towards meeting goals and objectives of CALFED. Monitoring will be done at several levels:

- System-wide status and trends (baseline) of the Bay-Delta and watershed -- This monitoring helps identify long-term changes occurring as a result of human and natural factors.

- Regional level -- This monitoring helps identify changes occurring on a regional level as a result of human and natural factors. This monitoring will provide data to assess the achievement of regional objectives and targets.

- Individual projects and actions -- This monitoring helps determine if objectives of the project or action are being accomplished. This includes monitoring for enhancement actions and compliance monitoring as part of mitigation requirements. Monitoring for groups of similar projects/actions will be coordinated to provide information broader information on effectiveness of certain projects/ actions.

- Real-time monitoring for water project operations -- This near real-time monitoring of the presence of fish near the project pumps provides operators with data to adjust operations to protect fish and maintain water supply reliability.

Develop monitoring protocols for all types of monitoring to ensure data consistency for each category of project/action

Data Management.

Develop and maintain a public online coordinated and linked system for the monitoring data and other relevant data. The data in the database will be used for comprehensive analysis and reporting and will be available to agency and nonagency scientists. Data will be subject to quality assurance/quality control protocols. Data will be made available when needed for assessment and reporting requirements.

Assessment.

Perform data analysis and interpretation of the raw data generated in the monitoring programs in order to evaluate the overall performance of the CALFED Program. The data analysis and interpretation will be subject to independent peer review. Provide scientific judgements as necessary in order for decision-makers to make program decisions. The assessment will detect:

- System-wide trends of program indicators
- Regional level trends and responses of indicators
- Project level responses of indicators
- Real-time trends of indicators relevant to water operations

Research

Manage a focused research program that targets key scientific uncertainties related to program decisions. Research priorities will be based on the science priorities described above (Function #1). The purpose of the research program is to determine how consequences of actions happen, while the monitoring program describes what consequences happened. Gaining an understanding of how trends changed or why projects resulted in certain consequences is a critical element of the adaptive management process. Develop and refine conceptual biological and mathematical models that link important causes and effects.

Trial Implementation Actions (pilot and full scale).

Provide advice on the design and execution of trial implementation actions. A trial implementation action is one in which there is some level of uncertainty on the effects of the action, but the level of knowledge and information supports trial implementation. Trial actions are a partnership between science, management and the public. Trial actions will follow scientific principles and processes. Depending on the level of knowledge and information available, trial actions may be designed as pilot actions or full scale actions.

Data from the trial actions will be assessed and reported as part of the Science Program and adaptive management process.

Reporting

Disseminate scientific information, including opinions, data, models, and findings, to State and Federal agencies, scientific community, general public, stakeholders, and decision-makers. The scientific information will be converted to useful information for policy level interests and decision-makers and disseminated through published reports, scientific articles, briefings and conferences. Findings will be provided for all levels of monitoring (system-wide, project level and real-time) and from focused research. Reports should also be provided to regulatory agencies that summarize scientific knowledge for use in regulatory management decisions.

Coordination and Integration.

Coordinate science functions and actions performed between the CALFED program elements (ERP, Levees, Water quality, and water management). Coordinate with all other science programs (IEP, CAMP, SFEI) that are based in the Bay-Delta and its' watershed. When appropriate, existing science programs and the CALFED Science Program will be integrated to increase the usefulness of the data generated and reduce duplication. Coordinate with related programs (such as CVPIA actions, regulatory programs, water operations) to assure that related programs use the science information in their management decisions. Related programs should provide input into all functions of the Science Program to assure the use of the information by the related programs.

Independent Science Review

Provide independent science review for the scientific aspects of the CALFED Program and related programs, (including the overall CALFED program and individual programs such as the ERP, Environmental Water Account, and water project operations). Convene independent science panels and boards to advise in the development, implementation, and results of the Science Program. Obtain peer review of published findings. Independent science review is needed for evaluating the basic underlying assumptions and process of the CALFED Science Program as well as evaluating the success of the programs and actions. Independent science review is important to assuring quality and maintaining public confidence in the program

Implementation of the CALFED Science Program

The CALFED Science Program will continue to be developed and refined consistent with the evolving CALFED Program. A large number of tasks, many of which were recommended in the CMARP appendix, have been completed or are now under way: articulating goals and objectives, developing conceptual models for ecosystem restoration, developing baseline and project monitoring protocols and indicators, deriving a set of priority science questions for Stage I, developing data management and reporting tools, planning a CALFED science conference, recruiting an interim science leader, initiating the ISB-ASET process for ERP, and developing consensus on the functions and structure of the CALFED Science Program. A number of tasks remain, however, before the CALFED Science Program can be fully implemented. Stage 1 actions for the CALFED Science Program are identified in section 2.11. In addition to the specific actions contained in section 2.11, the following are concepts which will continue to be refined as part of the implementation of a CALFED Science Program:

- Adaptive management -- CALFED has embraced an adaptive management implementation strategy because of significant uncertainties about the consequences of program actions. Active adaptive management is designing and executing trial actions as scientific experiments to learn how the actions affect the resources. Despite its appeal, active adaptive management is infrequently employed because few scientists and managers have practical experience, and because trials often require agency and public acceptance of some short-term risks to the resources or the associated economy. A management-science-stakeholder partnership process is needed for designing adaptive experiments, gaining policy approval and public acceptance, and executing and learning from the experiments.
- Coordination plan for science programs related to CALFED -- Success of the CALFED Science Program depends in part on coordination among existing research and monitoring in the San Francisco Estuary and its watershed. The Science Oversight Team recently convened a meeting of principal investigators from several of the larger monitoring and research programs in the study area to solicit ideas on how to improve coordination and make information more readily available to managers. The attendees agreed that such meetings were useful and that the CALFED science conference and an annual written report to CALFED and other interested parties would help provide a degree of coordination not now present. The Science Oversight Team will follow up on these suggestions.
- Science center feasibility -- There is general consensus among technical staff that the establishment of a Bay-Delta science center has merit and should be developed as a cornerstone of the CALFED science program. A feasibility report on this activity will be completed and presented to the CALFED Management Group for their review and input.

4.6 Adaptive Management

No long term plan for management of a system as complex as the Bay-Delta can predict exactly how the system will respond to Program efforts or foresee events such as earthquakes, climate change, or the introduction of new species to the system. Adaptive management, as an essential Program concept, acknowledges that there is a need to constantly monitor the system and adapt the actions that are taken to restore ecological health and improve water management. These adaptations will be necessary as conditions change and as more is learned about the system and how it responds. The Program's objectives will remain fixed over time, but the actions may be adjusted to assure that the solution is durable.

The concept of adaptive management is an essential part of every CALFED Program element, as well. The concept of adaptive management can be illustrated as applied to the Ecosystem Restoration Program element as shown in the following section.

Because the Bay-Delta ecosystem is large, complex, diverse and variable, it is impossible to know with certainty how it will respond to implementation of the ERP and other Program components. And although much is known about how the Bay-Delta functions, there are still significant information gaps that hamper the ability to sufficiently define problems and design restoration actions to address them. To account for this uncertainty, the ERP strategic plan outlines an adaptive management approach to restoring and managing the Bay-Delta ecosystem. An adaptive management approach acknowledges the uncertainty inherent in restoring and managing a natural system as large and complex as the Bay-Delta by designing and monitoring restoration actions so that they improve the understanding of the system while simultaneously restoring it. This approach allows revised restoration activities or better designed future restoration actions based upon the information learned from projects implemented earlier. It also provides the flexibility required to respond to changing Bay-Delta conditions and to identify and address resource conflicts and trade-offs. The Strategic Plan outlines the following steps as part of the adaptive management approach:

1. **Define the problem or set of problems to be addressed.** In order to design effective restoration actions, the geographic, temporal, and ecological parameters of the problem must clearly be defined. Decades of scientific study have already identified many of the problems affecting the health of the Bay-Delta ecosystem. However, for certain components of the Bay-Delta ecosystem, existing knowledge is insufficient to adequately define problems, so targeted research will be necessary to provide the information that allows the problems to be defined with greater detail.

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2. **Define goals and objectives for resolving identified problems.** It is important to establish the expectations of the overall restoration program and for individual restoration actions by articulating clear restoration goals. It is also important to establish the criteria that can be used to measure success in achieving goals by defining measurable objectives. Clear goals and measurable objectives help focus and direct ecosystem restoration, they help facilitate the design of restoration actions, and they help resource managers track incremental progress toward restoration objectives.
 3. **Develop conceptual models.** It is impossible to account for all of the variables that compose and animate an ecosystem as large and complex as the Bay-Delta; therefore, it is necessary to distill the most important ecosystem attributes and relationships into simplified models that can guide resource restoration and management. Conceptual models articulate hypotheses about what attributes and relationships are most important in an ecosystem. By articulating hypotheses about causal relationships in the ecosystem, conceptual models can suggest potential restoration actions or identify critical information gaps that help target additional research.
 4. **Develop and design alternative restoration or management actions.** Conceptual models will provide an assessment of the confidence we can place in potential restoration actions. For those actions about which there is confidence in how the ecosystem will respond, full-scale implementation can begin. If conceptual models suggest multiple viable restoration alternatives, pilot or demonstration projects to test the alternative hypotheses could be implemented. The resulting information will improve understanding of the ecosystem and help suggest which restoration actions are most effective in achieving restoration goals. Conceptual models can also help identify information gaps and needed targeted research.
 5. **Implement restoration actions.** Restoration actions selected for implementation must address the more serious environmental problems, must be linked to conceptual models, and must provide an opportunity to enrich our knowledge of how the ecosystem operates.
 6. **Monitor the ecosystem.** It is important to monitor the ecosystem to gauge how it responds to the restoration or management action. Monitoring provides the information necessary for assessing the effectiveness of a given restoration action. It also provides the data that will help improve understanding of the Bay-Delta ecosystem.

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7. **Update restoration and management actions.** The information derived from monitoring data allows resource managers to evaluate restoration actions and revise or update them to be more effective in achieving restoration goals and objectives. Monitoring data can also indicate when there is a need to refine the definition of a problem or the goals and objectives.

Similar models of these seven steps can be used to develop adaptive management approaches for the other program elements.

5. REGULATORY COMPLIANCE

The CALFED Program proposes specific actions to comply with the programmatic requirements of the National Historic Preservation Act; the Memorandum on Farmland Preservation and the Farmland Protection Policy Act; the Federal Agricultural Improvement and Reform Act of 1996 and the 1985 Food Security Act; Executive Orders 11988 (Floodplain Management), 11990 (Protection of Wetlands), and 12898 (Environmental Justice); the Federal Clean Air Act; and the Federal Climate Change consideration under NEPA. The Impact Analysis Document of the Draft Programmatic EIS/EIR contains information regarding compliance with some of the applicable laws and regulations to which CALFED is subject.

The Impact Analysis Document outlines programmatic compliance actions that still need to be finalized before the Final Programmatic EIS/EIR is completed. This section indicates how the CALFED Bay-Delta Program plans to comply with the Federal and State Endangered Species Acts; Fish and Wildlife Coordination Act; 404(b)(1) Guidelines (Clean Water Act); and the Coastal Zone Management Act. Further compliance steps will be taken by agencies carrying out specific projects in Phase III.

5.1 Multi-species Conservation Strategy

Introduction

The CALFED Multi-species Conservation Strategy (MSCS) is a comprehensive regulatory plan for the CALFED Program developed in accordance with the Federal Endangered Species Act (FESA), the California Endangered Species Act (CESA), and the Natural Community Conservation Planning Act (NCCPA). The MSCS describes CALFED's strategy for compliance with the programmatic State and Federal regulatory requirements for numerous species and habitat types within the CALFED Program study area, which includes the Delta Region, the Bay Region (including the outer Bay or near-shore area), the Sacramento River Region, the San Joaquin Region, and other State Water Project and Central Valley Project service areas (Other Service Areas). By implementing and adhering to the MSCS, the CALFED Program can be implemented in compliance with FESA, CESA and the NCCPA.

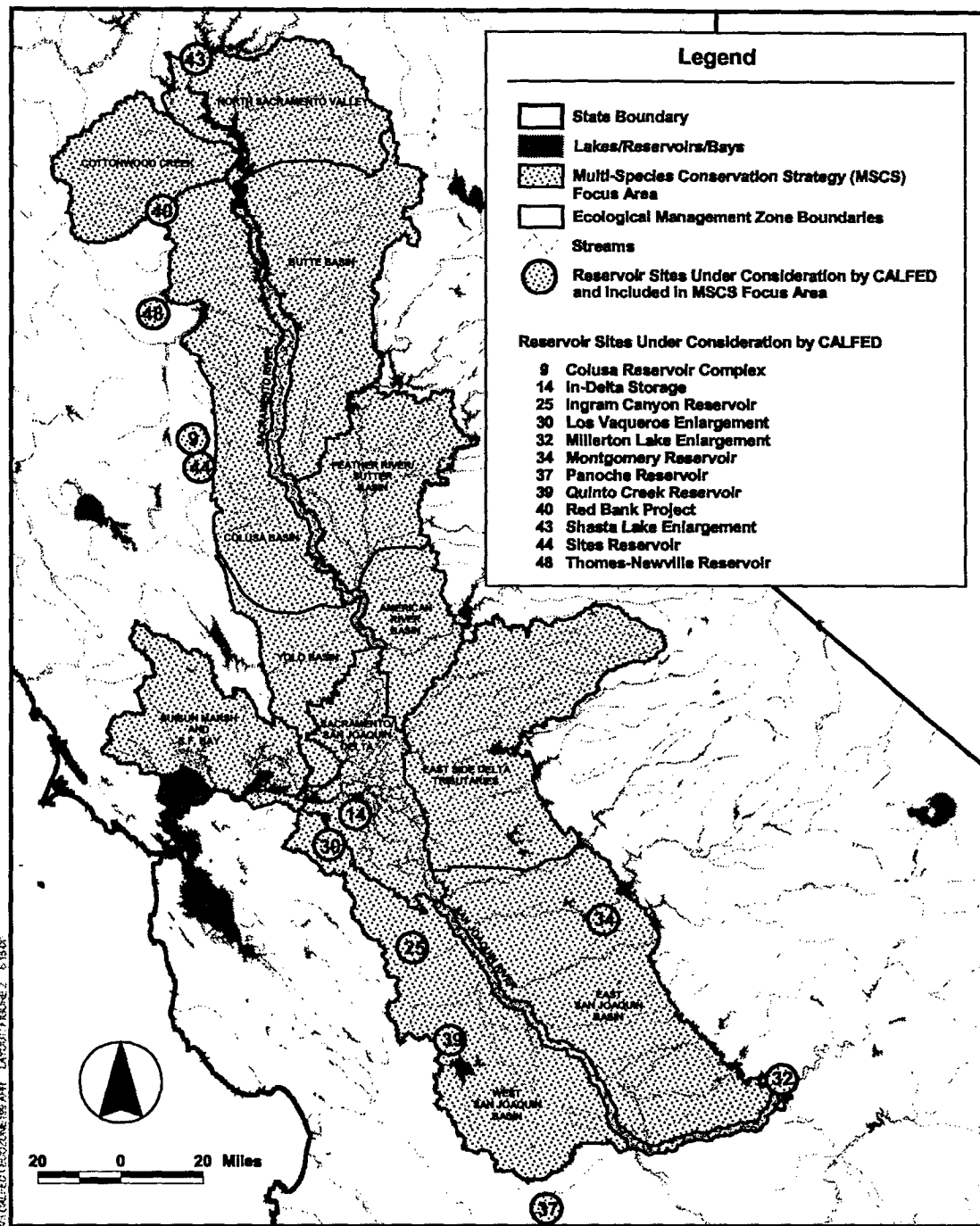
The MSCS serves two purposes. First, to address requirements in FESA, CESA and the NCCPA, the MSCS supplements the impact analysis in the programmatic EIS/EIR, identifies programmatic species goals and habitat goals, and identifies measures to meet these goals. The goals and the measures to meet the goals are derived, in large part, from the CALFED Ecosystem Restoration Program (ERP). Second, the MSCS establishes a simplified FESA, CESA and

NCCPA compliance process that may be used by entities implementing CALFED Program actions. Specifically, the MSCS:

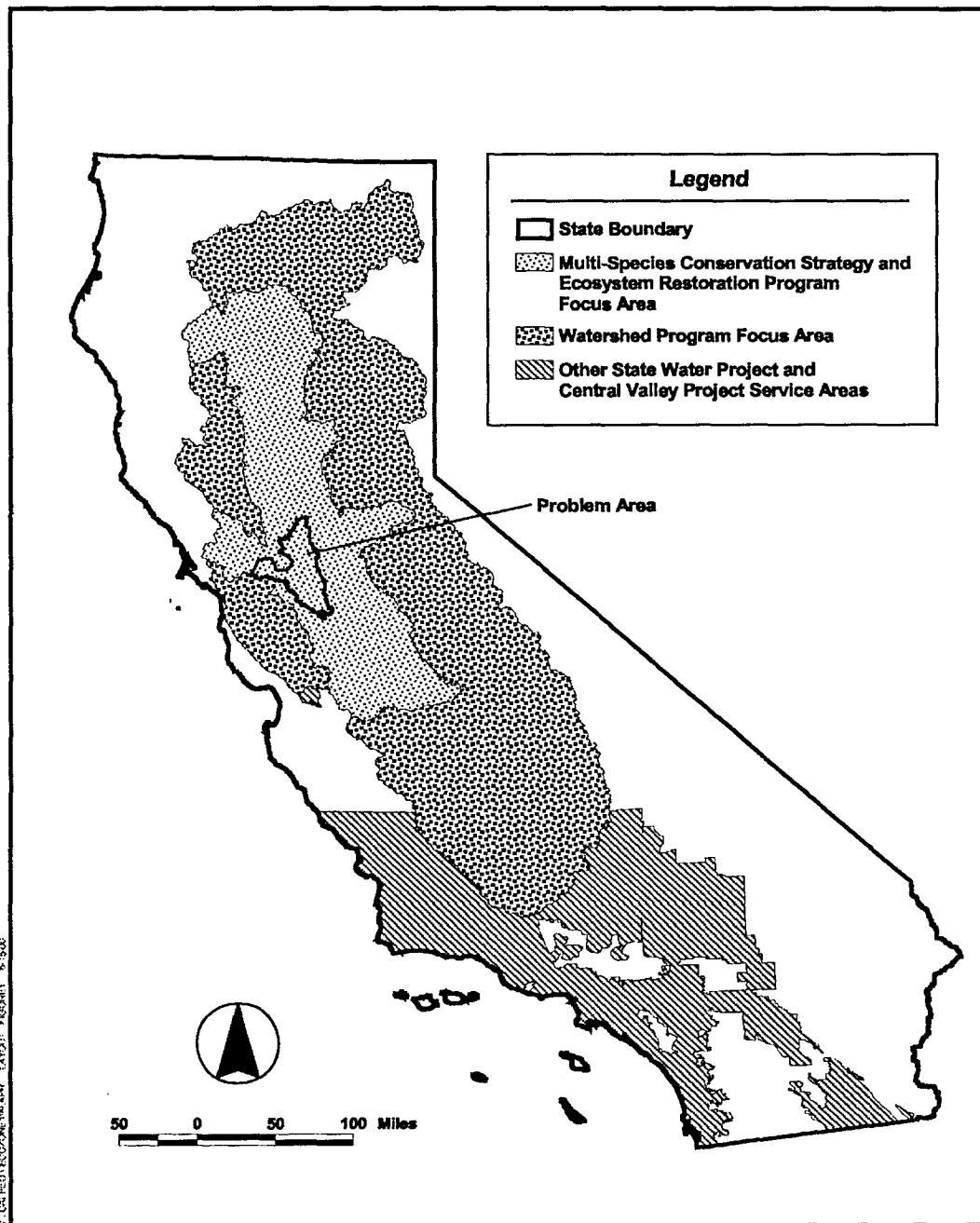
- Analyzes the programmatic effects of the CALFED Program on 244 evaluated species and 18 Natural Community Conservation Plan (NCCP) communities for the Federal and State ESAs and NCCPA purposes.
- Identifies CALFED's species goals ("recovery," "contribute to recovery," or "maintain") for each of the 244 evaluated species and conservation measures to achieve the goals.
- Specifies two types of conservation measures for achieving the species goals: (1) measures to avoid, minimize, and compensate for the Program's adverse effects on NCCP communities and evaluated species; and (2) measures to enhance NCCP communities and evaluated species that are not directly linked to the Program's adverse effects.
- Provides for the preparation of action-specific implementation plans (ASIPs) that simplifies compliance with Federal and State ESAs and the NCCPA for CALFED Program actions.

Geographic Scope of the MSCS The MSCS considers the potential impacts of CALFED Program actions within the following two areas:

- **Focus Area:** This area, shown on the map titled "Multi-Species Conservation Strategy Focus Area", includes the legally defined Delta, Suisun Bay, the Sacramento and San Joaquin rivers and their tributaries downstream of major dams, and the potential location of future reservoirs. The MSCS focus area is equivalent to the ERP focus study area, with the addition of the potential future reservoir sites. The legally defined Delta and Suisun Bay are also referred to collectively as the CALFED Problem Area, as shown in the map titled "CALFED Program Areas".
- **Other Service Areas:** The Other SWP and CVP Service Areas region includes two distinct, noncontiguous areas: in the north are the San Felipe Division's CVP service area and the South Bay SWP service area; to the south are the SWP service areas. The northern section of this region encompasses parts of the central coast counties of Santa Clara, San Benito, Santa Cruz, and Monterey. The southern portion includes parts of Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura Counties. The Other Service Areas are shown in the map entitled "CALFED Program Areas".



Multi-Species Conservation Strategy Focus Area



**CALFED
BAY-DELTA
PROGRAM**

CALFED Program Areas

Assessment of CALFED Program Impacts on Species And Habitats

To meet its biological and regulatory purposes, the MSCS presents information and recommendations based on a multi-year research and development process. The biological elements of the MSCS can be summarized as follows:

Evaluated Species List and Habitats List Over 400 fish, wildlife, and plant species that were known to occur or had the potential to occur within the MSCS focus area were identified. This broad group of species was reduced to 244 species to be evaluated in the MSCS. Species were included as "evaluated species" if they met one of the following criteria: (1) the species is Federally listed as threatened or endangered or California-listed as rare, threatened, endangered, or fully protected; (2) the species could become Federally or California-listed as threatened or endangered during the term of CALFED implementation (at least 30 years) and the species could be adversely affected by CALFED actions; or (3) CALFED actions could affect a substantial portion of the species' range or important habitat. Species in the Other Service Areas are not included in this analysis and will be treated in a subsequent process.

A habitat classification was developed for the MSCS that encompasses 18 habitat types and two fish communities. The 18 habitat types evaluated in the MSCS include: tidal perennial aquatic; valley riverine aquatic; montane riverine aquatic; lacustrine; saline emergent; tidal freshwater emergent; nontidal freshwater permanent emergent; natural seasonal wetland; managed seasonal wetland; valley/foothill riparian; montane riparian; grassland; inland dune scrub; upland scrub; valley/foothill woodland and forest; montane woodland and forest; upland cropland; and seasonally flooded agricultural land. The two fish groups evaluated in the MSCS include: anadromous fish species; and estuarine fish species. Collectively, the habitats and fish groups are referred to in the MSCS as "NCCP communities."

Species and Habitat Goals and Prescriptions The MSCS establishes conservation goals for species and goals for the NCCP communities. For species, the MSCS delineates goals of "recovery" or (R), "contribute to recovery" or (r), and "maintain" or (m).

Recovery (R): For species designated "R," CALFED has established a goal to recover the species within the CALFED ERP ecological management zones. A goal of "recovery" was assigned to those species whose recovery is dependent on restoration of the Delta and Suisun Bay/Marsh ecosystems and for which CALFED could reasonably be expected to undertake all or most of the actions necessary to recover the species. Recovery is achieved when the decline of a species is arrested or reversed, threats to the species are neutralized, and the species' long-term survival in nature is assured.

Recovery is equivalent, at a minimum, to the requirements of delisting a species under FESA and CESA. Certain species, such as anadromous fish, have threats outside the geographic scope or purview of the CALFED Program (i.e., ocean harvest regulated

under the Magnuson-Stevens Act). Therefore, in some instances CALFED may not be able to complete all actions potentially necessary to recover the species, however, CALFED will implement all necessary recovery actions within the ERP ecological management zones. For other species, CALFED aims to achieve more than would be required for delisting (e.g., restoration of a species and/or its habitat to a level beyond delisting requirements). The effort required to achieve the goal of "recovery" may be highly variable between species. In sum, to achieve the goal of recovery, CALFED is expected to undertake all actions within the ERP ecological management zones and program scope necessary to recover the species.

Species assigned the "R" goal include: Central Valley steelhead, Central Valley winter-, spring-, and fall/late fall-run chinook salmon, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, valley elderberry longhorn beetle, Lange's metalmark, Suisun ornate shrew, Suisun song sparrow, San Pablo song sparrow, Antioch dunes evening primrose, Contra Costa wallflower, soft bird's-beak, Suisun thistle, Mason's lilaeopsis, and Suisun marsh aster.

Contribute to Recovery (r): For species designated "r," CALFED will make specific contributions toward the recovery of the species. The goal "contribute to recovery" was assigned to those species for which CALFED actions affect only a limited portion of the species' range and/or CALFED actions have limited effects on the species.

To achieve the goal of contributing to a species' recovery, CALFED is expected to undertake some of the actions under its control and within its scope that are necessary to recover the species. When a species has a recovery plan, CALFED may implement both plan measures that are within the CALFED Problem Area, and some measures that are outside the Problem Area. For species without a recovery plan, CALFED will need to implement specific measures that will benefit the species.

Species assigned the "r" goal include: Sacramento perch, delta green ground beetle, giant garter snake, salt marsh harvest mouse, riparian brush rabbit, San Pablo California vole, San Joaquin Valley woodrat, least Bell's vireo, California clapper rail, California black rail, little willow flycatcher, bank swallow, western yellow-billed cuckoo, greater sandhill crane, Swainson's hawk, California yellow warbler, salt marsh common yellowthroat, Crampton's tructoria, Northern California black walnut, delta tule pea, delta mugwort, bristly sedge, delta coyote-thistle, alkali milkvetch, and Point Reyes bird's-beak.

Maintain (m): For species designated "m," the CALFED will take actions to maintain the species. This category is less rigorous than "contribute to recovery". The goal "maintain" was assigned to species expected to be minimally affected by CALFED actions. For this category, CALFED will avoid, minimize, and compensate for any adverse effects to the species commensurate with the level of effect on the species.

Actions may not actually contribute to the recovery of the species; however, at a minimum, they will be expected to not contribute to the need to list a species or degrade the status of a listed species. CALFED will also, to the extent practicable, improve habitat conditions for these species.

CALFED proposes the goal "maintain" for all evaluated species not assigned a goal of "recovery" or "contribute to recovery".

The MSCS establishes specific prescriptions for achieving the species goals. The prescriptions for "R" and "r" species provide habitat or population targets that, if met, would achieve the goal for the species. The prescription for all "m" species requires either an increase in, or no discernable adverse effect on, the size or distribution of species' populations.

For the NCCP communities, the MSCS establishes goals consistent with those described in the ERP for restoration and maintenance of aquatic, wetland, and riparian habitats in the Delta, Suisun Bay, and mainstems of the Sacramento and San Joaquin rivers. For upland habitats that were not the focus of the ERP, the MSCS establishes goals that focus on replacing habitat values and functions that are impacted by implementation of CALFED actions.

Assessment of CALFED Impacts on Species and Habitats The MSCS analyzes the beneficial and adverse impacts of implementing CALFED on the evaluated species and habitats. The approach to analyzing the Program impacts involved combining specific proposed CALFED actions with similar purposes into programmatic-level "summary outcomes." Potential impacts on NCCP communities and evaluated species of implementing CALFED actions were determined by analyzing activities that could be associated with implementing summary outcomes (e.g., flooding of Delta islands to restore tidal freshwater emergent wetland) and that could cause a direct or indirect adverse effect on an NCCP habitat or result in the harm or mortality to an evaluated species.

Conservation Measures The MSCS developed two types of conservation measures for achieving NCCP community and evaluated species goals:

- measures to avoid, minimize, and compensate for CALFED's adverse effects on NCCP communities and evaluated species; and
- measures to enhance NCCP communities and evaluated species that are not directly linked to CALFED's adverse impacts.

Summary of Effects of Implementing CALFED Actions and Conservation Measures

Implementation of CALFED actions would result in conversion of existing natural (non-agricultural) habitat types to other natural habitat types. For example, nontidal freshwater permanent emergent wetlands present on Delta islands could be converted to tidal freshwater

emergent wetlands as a result of setting back or breaching Delta levees. There could also be a loss of natural habitat, for example, during construction of conveyance facilities, roads, or other infrastructure. Implementation of CALFED actions and conservation measures that compensate for habitat loss, however, would result in increases in the extent or quality of most natural NCCP habitats. Some overall loss of grassland and upland scrub habitats could result from conversion of these habitat types to other natural habitats or to other uses.

Implementation of proposed CALFED actions would also result in conversion of a substantial amount of agricultural lands (primarily in the Delta region) to natural habitat or to other uses (e.g., conveyance and storage facilities). The habitat values for evaluated species provided by affected agricultural lands, however, would be replaced or increased as a result of: (1) restoration and enhancement of natural NCCP habitats; (2) enhancement of habitat values provided by existing agricultural lands (i.e., converting cropping patterns to crops that yield higher forage values for wildlife, implementing wildlife-friendly agricultural practices); (3) and implementation of conservation measures to compensate for loss of habitat values.

Implementation of the MSCS' conservation measures is expected to provide ample compensation for the potential adverse effects on species from individual CALFED actions. Further, implementation of CALFED elements such as the ERP is expected to increase substantially the extent or quality of most natural NCCP habitats.

Relationship to CALFED's Ecosystem Restoration Program

Implementation of the CALFED Program, including the ERP, will result in actions that impact species and their habitats. These actions must comply with the FESA and CESA where they include impacts to species listed under the two acts or other sensitive species.

Certain conservation measures in the MSCS are designed to avoid, minimize, and compensate for potential CALFED impacts on the evaluated species and habitats. The MSCS also includes conservation measures that enhance NCCP communities and evaluated species that are not directly linked to CALFED's adverse impacts. The second type of conservation measures contribute to the ERP by identifying temporal or locational refinements to existing ERP actions. The MSCS also includes conservation measures that refine other CALFED program elements and add specificity to CALFED's Science Program.

Framework for Regulatory Compliance

The MSCS serves to ensure that the CALFED Program as a whole and individual CALFED Program actions will be implemented in compliance with the State and Federal endangered species laws.

Programmatic Compliance with Endangered Species Laws The MSCS provides a two-tiered approach to compliance with Federal and State ESAs and the NCCPA that corresponds to CALFED's two-tiered approach to compliance with NEPA and CEQA. The MSCS provides a program-level evaluation of CALFED under the FESA and the NCCPA, just as the Programmatic EIS/EIR provides a program-level evaluation under NEPA and CEQA. ASIPs are intended to complement the second-tier, project-level environmental review of CALFED Program actions that is anticipated in the Programmatic EIS/EIR.

The MSCS will serve as the biological assessment of the entire CALFED Program for purposes of programmatic compliance with Section 7 of FESA. Based on the MSCS and other relevant information, the USFWS and NMFS will prepare programmatic biological opinions for the CALFED Program. Subsequently, as CALFED Program actions or groups of actions are identified and defined, ASIPs can be prepared that use information and analyses in the MSCS and the programmatic biological opinions. The ASIPs will serve as the biological assessment of the Program actions or groups of actions; the ASIPs will provide necessary details about the actions and their impacts on species and NCCP communities evaluated in the MSCS. The USFWS and NMFS then will use the ASIPs to develop action-specific biological opinions.

The NCCPA provides for the preparation of NCCPs. NCCPs identify and provide for the regional or area-wide protection and perpetuation of natural wildlife diversity, while allowing compatible and appropriate development and growth, and may be used for compliance with CESA. The MSCS will be submitted to DFG as a proposed programmatic NCCP. Based on the MSCS and other relevant information, DFG will determine whether the MSCS complies with the NCCPA. If DFG determines that the MSCS complies with the NCCPA, DFG will prepare an NCCP approval and issue supporting findings. As under FESA, once specific CALFED Program actions or groups of actions are identified and defined, ASIPs that use information and analyses in the MSCS and the programmatic NCCP approval will provide necessary details about the actions and their impacts on species and NCCP communities evaluated in the MSCS. The ASIPs then can serve as project-specific NCCPs for individual Program actions or groups of actions.

The MSCS helps to assure that CALFED Program actions can be completed in accordance with Federal and State ESAs and the NCCPA; and that the compliance process will be systematic, efficient, and predictable. The MSCS will not provide the CALFED Program with general authority to take endangered species or threatened species. However, the MSCS compliance process provides the means by which CALFED implementing entities may obtain authorizations

under FESA and the NCCPA to allow incidental take of endangered or threatened covered species that may be caused by specific CALFED Program actions or groups of actions.

Project-Level Compliance with Endangered Species Laws Due to the varying level in which CALFED Program actions are currently defined, and the need for additional biological data for some species, the MSCS in itself cannot provide the analysis needed to achieve compliance with FESA, CESA, and the NCCPA for all or even a subset of Program actions. In most cases, additional information will be required for the wildlife agencies to ascertain a CALFED Program action's specific impacts on species to the extent required by FESA, CESA, and the NCCPA. The MSCS, the programmatic biological opinions, and DFG's NCCP determination will therefore serve as the springboard for a simplified regulatory compliance process to allow those entities implementing CALFED actions to comply with FESA, CESA, and the NCCPA and to obtain efficiently any required take authorizations.

Entities implementing CALFED Program actions will be required to prepare an action-specific implementation plan (ASIP) for the proposed Program action or group of actions being implemented collectively. The ASIP will be based on and tier from the data, information, analysis, and conservation measures in the MSCS. The implementing entity will submit the ASIP to the USFWS, NMFS, and DFG. The wildlife agencies will utilize both the MSCS and the ASIPs to meet their respective agency's regulatory requirements for analyzing the effects of Program actions on species and their habitats. The USFWS, NMFS, and DFG will authorize take of covered species, where appropriate, based on the analysis and conservation measures in the MSCS and the ASIP. The agencies will coordinate their reviews of the ASIPs to determine jointly the conservation measures necessary for compliance with FESA, CESA, and the NCCPA.

The USFWS and NMFS will determine compliance with FESA by entities implementing CALFED Program actions primarily under section 7 of the ESA. The Services may issue a FESA section 10(a)(1)(B) permit if a non-Federal entity proposes to implement one or more CALFED actions that are not authorized, funded, or carried out by a Federal agency. The ASIP will contain all information required for compliance under either FESA section 7 or FESA section 10(a)(1)(B).

The DFG will determine compliance with the NCCPA under section 2835 of the California Fish and Game Code, which is part of the NCCPA. The ASIP will contain all information required for compliance with the NCCPA.

Content of Action-Specific Implementation Plans To fulfill the requirements of FESA section 7, FESA section 10, and Fish and Game Code section 2835, each ASIP will include the following:

- A detailed project description of the CALFED Program action or group of actions to be implemented, including site specific and operational information.

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- A list of the listed, proposed, and other sensitive species that occur in the action area.
 - An analysis identifying the direct, indirect, and cumulative impacts on listed and proposed State and Federal species, as well as other sensitive species occurring in the action area (along with an analysis of impacts that may occur to any designated critical habitat) likely to result from the proposed CALFED Program action or group of actions, as well as actions interrelated and interdependent to the proposed action.
 - The measures the implementing entity will undertake to minimize and mitigate such impacts; a plan to monitor the impacts and the implementation and effectiveness of the minimization and mitigation measures; the funding that will be made available to undertake the minimization and mitigation measures; and the procedures to address unforeseen circumstances.
 - A discussion of alternative actions the applicant considered that would not result in take, and the reasons why such alternatives are not being utilized.
 - Additional measures the wildlife agencies may require as necessary or appropriate for compliance with FESA, CESA, and the NCCPA.

The ASIPs will be based, in large part, on the biological data, CALFED Program information, impacts analysis, and conservation measures in the MSCS. Additional information, analysis, and conservation measures will be required for Program actions that are not yet well-defined. The MSCS has somewhat reduced the amount of additional information, analysis, and conservation measures that will be required of an implementing entity by offering as much detail as feasible on the expected impacts of Program actions on species and habitats. The ASIPs must be consistent with the species goals, prescriptions, and conservation measures in the MSCS for species affected by the proposed CALFED Program action. To obtain take authorization for a CALFED Program action, the ASIP must incorporate all applicable conservation measures in the MSCS and any additional measures required by the wildlife agencies where the MSCS references the need for additional information.

The MSCS and the ASIPs are the mechanism for implementing entities to comply with FESA, CESA, and the NCCPA for CALFED Program actions. The ASIPs will not address all regulatory and permitting needs for Program actions. Rather, all CALFED Program actions will require environmental review and permitting under other State and Federal laws before the actions can be implemented. The CALFED Program is developing a coordinated environmental review and permitting process for Program actions. The coordinated permitting process includes the MSCS' simplified process for complying with FESA, CESA, and the NCCPA.

Covered Species Covered species will be identified in the programmatic biological opinions prepared by the NMFS and the USFWS, and in the programmatic NCCP determination prepared by DFG. Only species currently identified as evaluated species will be included in the list of covered species. Species that the wildlife agencies determine are not adequately conserved and protected from jeopardy by the MSCS and ERP will not be included as covered species. Evaluated species whose habitat will not be significantly increased or enhanced under the MSCS and ERP are most likely to be excluded.

Commitments

As key CALFED Program elements such as the ERP and the EWA are funded and implemented, the wildlife agencies will rely increasingly on CALFED's conservation of covered species when evaluating the long-term effects of CALFED Program actions. The potential need for conservation measures that are new or different than the measures in the MSCS will decrease as conditions for covered species are shown to improve. The MSCS reflects this fact by providing the basis for commitments to CALFED agencies that the conservation measures identified in the MSCS' simplified permitting process (ASIPs) will not be substantially increased or altered over time.

In addition, the MSCS provides the framework for commitments to cooperating landowners that they will not be prevented from continuing their existing land uses because of the implementation of CALFED Program actions or MSCS conservation measures. Many landowners may be concerned that if the numbers of threatened and endangered species within the focus area increases, the use of land or water in or near the species' habitat will be restricted by ESA and CESA. Cooperating landowner programs are intended to address this concern and to preserve compatible land uses within the focus area. Cooperating landowner programs may include, where appropriate:

- Protections for farmers and ranchers who neighbor land preserved by CALFED agencies for wildlife conservation purposes under the CALFED Program.
- Protections for landowners or local public entities who maintain levees on which wildlife habitat will be created or enhanced under the CALFED Program.
- Protections for landowners or local public entities who use or divert water from streams or rivers newly opened to anadromous fishes under the CALFED Program.
- Protections for landowners or local public entities who operate and maintain water diversions in which fish screens will be installed under the CALFED Program.

Funding

In order to comply with the NCCP guidelines, the MSCS must address how the strategy will be funded. As noted in the Introduction to this section, the MSCS is an integral part of the CALFED Program and therefore, will be funded through the finance strategy developed for the Program. As implementation of the Program proceeds, funding of the conservation measures necessary to avoid, minimize and compensate for any adverse impact to the covered species and the additional measures to enhance NCCP communities and evaluated species that are not directly linked to CALFED's adverse impacts will be addressed in the Action Specific Implementation Plan. It is anticipated that the agency or entity initiating the ASIP, will provide the funding for the necessary conservation measures, though the actual implementation of the measures may be accomplished through the Ecosystem Restoration Program.

5.2 Fish and Wildlife Coordination Act

Under Subsection 2(a) of the Fish and Wildlife Coordination Act (FWCA), Federal agencies are responsible for consulting with the USFWS and NMFS to conserve wildlife resources by preventing loss and damage, as well as providing for their development and improvement in connection with water resource projects. FWCA Subsection 2(b) requires the USFWS and NMFS to (1) report its recommendations for wildlife conservation and development, and the expected results; and (2) describe the damage to wildlife attributable to the project and the measures proposed for mitigating or compensating for these damages.

The USFWS and NMFS will not issue a separate FWCA Report on the CALFED Program for incorporation into the Programmatic EIS/EIR. The Programmatic EIS/EIR for the CALFED Program includes an impact analysis that was developed in coordination with the USFWS and NMFS. The USFWS' and NMFS' recommendations for improving the Program and reducing impacts on fish and wildlife have been incorporated into the Program and the Programmatic EIS/EIR. Because of this extensive coordination, the incorporation of the USFWS's recommendations, and the programmatic nature of the CALFED Program, the USFWS and NMFS believe that the requirements of Section (b)(2) of the FWCA have been fulfilled. However, future CALFED Program actions that tier from the Programmatic EIS/EIR have not fulfilled the requirements of Section (b)(2) of the FWCA. Separate FWCA reports will need to be completed for those Phase III actions. The USFWS and NMFS will complete FWCA reports for appropriate Phase III actions, presenting their agency's recommendations to avoid, minimize, and mitigate project impacts on fish and wildlife resources. FWCA reports represent the USFWS' and NMFS' recommendations and are not binding conditions. Although FWCA reports are not subject to public review and comment, they will be available for public and stakeholder review following their completion.

5.3 Clean Water Act Section 404

The alternatives being analyzed in this Programmatic EIS/EIR include numerous activities that would involve the discharge of dredged or fill material to waters of the United States (including wetlands). As such, these activities require authorization under Section 404 of the Clean Water Act before they can proceed (Section 404 permits). Activities which would require Section 404 permits range from projects involving significant construction of new infrastructure (such as new surface water storage facilities) to less controversial projects (such as creating new wetland habitat by contouring land and changing local hydrology).

The U.S. Army Corps of Engineers (Corps) issues Section 404 permits. Before the Corps can issue a Section 404 permit for a project, it must determine, among other things, whether a proposed project complies with regulations issued by EPA pursuant to Section 404(b)(1) of the Clean Water Act (Section 404(b)(1) Guidelines). The Corps cannot determine whether to issue a Section 404 permit for a particular project until a project-specific administrative record is developed to permit a determination as to whether the project complies with the Section 404(b)(1) Guidelines as well as other relevant regulatory requirements. Because project-specific evaluations for the CALFED Program will only be completed after the ROD for this Programmatic EIS/EIR, no site-specific Section 404 permits will be issued for Program projects at the time of the ROD. However, the Corps, EPA and Program staff are developing a Memorandum of Understanding (MOU) to facilitate timely consideration of Section 404 permits for Program projects.

Conceptually, the MOU will provide a mechanism for integrating information developed at the programmatic level (including the Programmatic EIS/EIR) into the site-specific decisions on Section 404 permits. Programmatic information of particular relevance to the Section 404 permits includes:

- Description of Program projects that are likely to need Section 404 permits, including assessment of the purpose and need for these projects.
- Analysis of alternatives to surface storage including groundwater storage, water use efficiency, and transfers.
- Assessment of the economic costs and environmental impacts of specific surface storage alternatives in the Integrated Storage Investigation.
- Description of the conveyance strategies under consideration and the process for further evaluation of the conveyance options.

A critical issue that the MOU is designed to address is the extent to which less environmentally damaging alternatives to surface storage (for example groundwater storage, water use efficiency and transfers) can be practicably implemented and the extent to which these alternatives can contribute to project purposes, since the Section 404(b)(1) Guidelines only authorize issuing Section 404 permits if there are no less environmentally damaging practicable alternatives to the proposed discharge. Thus, the MOU is intended to document the commitments in the ROD to pursuing these less environmentally damaging alternatives to surface storage, and set forth a process for assessing the need for additional storage in light of the commitments to alternative approaches to addressing Program goals.

Under Section 401 of the CWA, the SWRCB certifies that Federally licensed or funded projects are consistent with maintenance or attainment of water quality standards. The SWRCB and other appropriate CALFED agencies are working to develop an MOA to establish a process for determining Section 401 certification for CALFED projects requiring such certification.

5.4 Coastal Zone Management Act

Under the Coastal Zone Management Act (CZMA) of 1972, coastal states are required to develop Coastal Zone Management Programs, and Federal agencies are required to certify that any proposed activities in or affecting the coastal zone are consistent with the State's program. In California, the San Francisco Bay Conservation and Development Commission (BCDC) oversees the San Francisco Bay segment of California's Coastal Zone Management Program. Among other areas, BCDC also has permit jurisdiction over projects in certain waterways up to the Sacramento-San Joaquin Delta (east of Chipps Island) that empty into the Bay and in specific saltponds and managed wetlands.

The Program has prepared a Programmatic Coastal Zone Management Act Consistency Determination that documents the possible effects of the Preferred Program Alternative on coastal resources. The consistency determination documents the actions that the Program will take to ensure that the Preferred Program Alternative is carried out in a manner consistent, to the maximum extent practicable, with the CZMA and the California Coastal Act of 1976. Since the March 1998 Programmatic EIS/EIR did not contain a Preferred Program Alternative, a Programmatic CZMA Consistency Determination for the Program was not previously submitted to the BCDC. The CALFED Program provided a draft CZMA Consistency Determination to the BCDC in August 1999. Since a Preferred Program Alternative has been selected, a Programmatic CZMA Consistency Determination will be presented to the BCDC in summer 2000.

5.5 Clean Water Act Section 303

Section 303 of the Clean Water Act requires all states to conduct triennial reviews to evaluate and, where necessary to protect the designated uses for the state's waters, revise water quality standards. In California, the SWRCB is the recognized entity responsible for implementing the triennial review process.

The triennial review process of Section 303 is particularly well-suited to the adaptive management approach to ecosystem protection being proposed in the CALFED Program. CALFED intends to work with the SWRCB, RWQCBs, and EPA to assure that the implementation of the Water Quality Program, Ecosystem Restoration Program, and other CALFED Program elements is consistent with and, where appropriate, incorporated into the ongoing regulatory programs based on Section 303.

Section 303(d) of the Federal CWA requires that states develop a list of waterbodies with impaired water quality. The Section 303(d) list identifies impaired waterbodies and sources of contamination, such as mine drainage, agricultural drainage, urban and industrial runoff, and municipal and industrial wastewater discharges. The SWRCB is responsible for developing the Section 303(d) list.

The Program is using the Section 303(d) list as revised in 1998 for assessment of existing environmental water quality problems in the Central Valley and Bay-Delta. This list includes water bodies that were considered for Water Quality Program actions. The Water Quality Program will continue to use the Section 303(d) list and other information as proposed actions are considered for implementation.

5.6 Phase III Site-Specific Environmental Documentation and Permitting

During Phase III, second-tier site-specific environmental documents will be prepared for the individual Program actions that will be developed and implemented during Phase III. Second-tier documents will be prepared after the Programmatic EIS/EIR is certified; these documents will concentrate on issues specific to the individual parts of the Program elements, including the site chosen for the action. Second-tier documents will focus on project-specific impacts and the mitigation measures necessary to reduce potential impacts. The second-tier documents will summarize and incorporate by reference the issues discussed in the broader program-oriented EIS/EIR and focus on the issues specific to the part of the overall program being implemented. Information presented in the second-tier EIS/EIRs will be specific to a smaller area within the

CALFED Bay-Delta study area and will focus on impacts within the smaller area and individual action-level mitigation performance criteria.

Many entities have expressed concerns about the effects of the CALFED Program (especially the ERP and Levee Program) on agricultural resources. Agricultural resources are an important feature of the existing environment of the State and are recognized and protected under CEQA and State and Federal policy. One of the major principles of the State's agricultural policy is to sustain the long-term productivity of the State's agriculture by conserving and protecting the soil, water, and air which are agriculture's basic resources. It is CALFED policy that adverse environmental effects to agricultural resources resulting from CALFED programs, projects, and actions will be fully assessed and disclosed under CEQA and NEPA, and avoided or mitigated to the extent required by law. Assessment, disclosure, and avoidance and other mitigation strategies have been developed at the programmatic level and will be developed at the project-specific levels in consultation with other State, Federal, and local agencies with special expertise or authority over agricultural resources which may be affected by the Program, such as the California Department of Food and Agriculture.

CALFED will implement hundreds or thousands of actions that require environmental permits -- potentially over 100 actions in the first year alone. A CALFED permit clearinghouse will be established to assure that State and Federal environmental compliance and associated environmental permitting is completed in an efficient and timely manner so as not to cause unnecessary delays or preclude scheduled project implementation. The clearinghouse is expected to include dedicated staff for permit preparation, regulatory review, and permit tracking. The clearinghouse will not circumvent permitting processes or give preferential treatment to agency projects, but will ensure fairness to both CALFED agency projects and projects sponsored by other entities.

5.7 Coordination

Central Valley Project Improvement Act

The USFWS and the USBR are jointly responsible for implementing the Central Valley Project Improvement Act (CVPIA). The Act includes provisions intended to restore anadromous fish populations, improve and facilitate water transfers, implement water conservation actions, provide water for wildlife refuges in the Central Valley, and improve flows on the Trinity River for anadromous fish. It is the foundation for the Bay-Delta Accord and the CALFED Program.

Many of the provisions of the CVPIA parallel elements of the CALFED Program. CALFED's Ecosystem Restoration Program, Water Transfer Program, Water Use Efficiency Program, and

Water Management Strategy are complementary to programs with similar goals being implemented under the CVPIA. Coordination of similar elements of the CALFED and CVPIA programs is a necessary priority to ensure that the common elements of both the CVPIA and CALFED are implemented in the most efficient way.

The USFWS and the USBR, as member agencies of CALFED, have played essential roles in developing the Program's Preferred Program Alternative. The USFWS and the USBR will continue to ensure that CALFED and CVPIA programs, as well as all other programs and statutory obligations, are coordinated.

6. GLOSSARY AND ACRONYMS

Glossary

AF Abbreviation for acre feet; the volume of water that would cover one acre to a depth of one foot, or 325,851 gallons of water. On average, could supply 1-2 households with water for a year. A flow of 1 cubic foot per second for a day is approximately 2 AF.

Alternative A collection of actions or action categories assembled to provide a comprehensive solution to problems in the Bay-Delta system.

AFRP Anadromous Fish Restoration Program, part of the Central Valley Project Improvement Act. The AFRP identified instream and Delta flows needed for recovery of anadromous fish.

Action A structure, operating criteria, program, regulation, policy, or restoration activity that is intended to address a problem or resolve a conflict in the Bay-Delta system.

Anadromous Fish Fish that spend a part of their life cycle in the sea and return to freshwater streams to spawn.

B(2) Water Statutory mandate to manage the water dedicated to fish and wildlife purposes pursuant to Section 3406(b)(2) of the Central Valley Project Improvement Act.

Banks Pumping Plant The State Water Project (SWP) export pumping plant in the south Delta. The plant is located downstream of Clifton Court Forebay.

BDAC The Bay-Delta Advisory Council, a 34-member federally chartered citizens' advisory committee. BDAC provides formal comment and advice to the CALFED agencies during regularly scheduled meetings.

Best Management Practices (BMP) An urban water conservation measure that the California Urban Water Conservation Council agrees to implement among member agencies. The term is also used in reference to water quality standards, watershed management activities, and others.

Carriage Water Additional flows released during export periods to ensure maintenance of water quality standards and assist with maintaining natural outflow patterns in Delta channels. For instance, a portion of transfer water released from upstream of the Delta intended for export from south Delta would be used for Delta outflow.

Central Valley Project (CVP) Federally operated water management and conveyance system that provides water to agricultural, urban, and industrial users in California. The CVP was originally authorized by legislation in 1937.

Central Valley Project Improvement Act (CVPIA) This federal legislation, signed into law on October 30, 1992, mandates major changes in the management of the federal Central Valley Project. The CVPIA puts fish and wildlife on an equal footing with agricultural, municipal, industrial, and hydropower users.

Channel Islands Natural, unveeved land masses within Delta channels. Typically good sources of habitat.

Clifton Court Forebay The in-Delta storage used to regulate flows to the Banks Pumping Plant.

Common Delta Pool Delta provides a common resource, including fresh water supply for all Delta water users, and all those whose actions have an impact on the Delta environment share in the obligation to restore, maintain and protect Delta resources, including water supplies, water quality, and natural habitat.

Conceptual Model An explicit description of the critical cause-and-effect pathways in ecosystem function. A conceptual model includes a summary of current knowledge and hypotheses about ecosystem structure and function, and highlights key uncertainties where research might be necessary. Alternative or competing conceptual models illustrate areas of uncertainty, paving the way for suitably-scaled experimental manipulations designed both to restore and explore the ecosystem. Conceptual models also help to define monitoring needs, and bases for quantitative modeling.

Conjunctive Use The operation of a groundwater basin in combination with a surface water storage and conveyance system. Water is stored in the ground water basin for later use in place of or to supplement surface supplies. Water is stored by intentionally recharging the basin during years of above-average water supply.

Conveyance A pipeline, canal, natural channel or other similar facility that transports water from one location to another.

Delta Cross Channel Existing gated structure and channel connecting the Sacramento River at Walnut Grove to the North Fork Mokelumne River. The facility was constructed as part of the CVP to enhance movement of Sacramento River water into the central Delta and to the south Delta export pumps. Operating criteria currently require the gates to be closed for specific periods to keep downstream migrating fish in the Sacramento River and to prevent flooding of the central Delta.

Delta Inflow The combined water flow entering the Delta at a given time from the Sacramento River, San Joaquin River, and other tributaries.

Delta Islands Islands in the Sacramento-San Joaquin Delta protected by levees. Delta Islands provide space for numerous functions including agriculture, communities, and important infrastructure such as transmission lines, pipelines, and roadways.

Delta Outflow The net amount of water (not including tidal flows) at a given time flowing out of the Delta towards the San Francisco Bay. The Delta outflow equals Delta inflow minus the water used within the Delta and the exports from the Delta.

Demand Management Programs that seek to reduce demand for water through conservation, rate incentives, drought rationing, and other activities.

Direct Mortality The direct loss of fish associated with facilities (forebay, fish screens, and salvage facilities) for the south Delta export pumps. This direct mortality is a portion of the total fish mortality resulting from operation of the export pumps (see indirect mortality).

Diversions The action of taking water out of a river system or changing the flow of water in a system for use in another location.

Drought Conditions A time when rainfall and runoff are much less than average. One method to categorize annual rainfall is as follows, with the last two categories being drought conditions: wet, above normal, below normal, dry critical.

Dual Conveyance A means of improving conveyance across the Delta by both improving through-Delta conveyance and isolating a portion of conveyance from Delta channels.

Ecosystem A recognizable, relatively homogeneous unit that includes organisms, their environment, and all the interactions among them.

Ecosystem Manager (Trustee) An entity responsible for environmental improvements in the Bay-Delta system with the financial means, legal rights, authorities, and discretion needed to carry out the Ecosystem Restoration Program (ERP).

Entrainment The process of drawing fish into diversions along with water, resulting in the loss of such fish.

Environmental Water Account A method of accounting for the water and financial assets that can be managed to provide additional protections for fishery resources beyond prescriptive standards.

ESA (Endangered Species Act) Federal (FESA) and State (CESA) legislation that provides protection for species that are in danger of extinction.

Export Water diversion from the Delta used for purposes outside the Delta.

Export-Inflow Ratio (E-I Ratio) This requirement presently limits Delta exports by the State and federal water projects to a percentage of Delta inflow. In July through January, 65% of inflow can be exported. During February through June, months most critical to fisheries, the allowable E-I ratio is reduced to 35% to help diminish reverse flows and the resulting entrainment of fish caused by south Delta export operations.

Fish Entrainment The incidental capture and loss of fish during water diversion.

Fish Salvage The process of screening fish at the south Delta export facilities and physically transporting them by truck to release in other parts of the Delta. This generally results in higher fish mortality than a more conventional fish screen where screened fish simply return to the river and continue downstream. Fish salvage is required at the existing export facilities since there is no flow continuing downstream to carry the fish away.

Fish Screens Physical structures placed at water diversion facilities to keep fish from getting pulled into the facility and dying there.

Flexible Operations Operation of the south Delta export pumps that would allow reducing export pumping at times critical to fish and increasing export pumping at other times. Flexible operations would allow higher or lower export rates and export-inflow ratios than prescribed by the *1995 Water Quality Control Plan*. Pumping could deviate from currently permitted rates seasonally and on a real-time basis in response to Delta flows and fish distributions.

Grasslands Bypass Project The Grasslands Bypass Project is a means of diverting selenium-contaminated agricultural drainage water away from fresh water channels serving Grassland wetlands. The project includes interim use of a 28-mile section of the San Luis Drain with strict monthly and annual selenium-load targets for discharges from the 97,000 acre project area.

Groundwater Banking Storing water in the ground for use to meet demand during dry years. In-lieu Groundwater Banking replaces groundwater used by users with surface water to build up and save underground water supply for use during drought conditions.

Hood A location on the Sacramento River in the northern Delta above the major tidal influence. It has been identified as one potential location for a new diversion, if it is determined to be needed, from the Sacramento River. A new intake at this point could move more water into the central Delta or be the beginning for an isolated facility. Sacramento River water is much fresher

at this location than at the export facilities and a diversion at this point may have substantially fewer impacts on most species of fish than the current diversions at the export pumps.

Hydrograph A chart or graph showing the change in flow over time for a particular stream or river.

In-Delta Storage Water storage within the Delta by converting an existing island to a reservoir. The storage can help facilitate flexible operations of the export pumps by allowing export of stored water when critical fish species are present in the south Delta.

Indirect Mortality The indirect fish losses from operating the Delta Cross Channel and south Delta export pumps. For example, fish diverted from the Sacramento River into the central and south Delta experience higher mortality through increased stress, small agricultural water diversions, poor water quality, predation, reduced shallow water habitat for fry, higher water temperatures, and higher residence times. This indirect mortality is a portion of the total fish mortality resulting from operation of the export pumps (see direct mortality).

Interagency Coordinated Program A cooperative effort among the California Department of Fish and Game, the U.S. Bureau of Reclamation, the U.S. Fish and Wildlife Service, and the Grasslands Water District to develop optimum water use planning for managed wetlands of the Central Valley.

Isolated Conveyance Facility A canal or pipeline that transports water between two different locations while keeping it separate from Delta water.

Land Fallowing/Retirement Allowing previously irrigated agricultural land to temporarily lie idle (fallowing) or purchasing such land and allowing it to remain out of production for a variety of purposes for a long period of time.

MAF An abbreviation for million acre feet, as in 2 MAF or 2,000,000 AF.; 10,000 cfs flowing for a year is about 7 MAF.

Mine Drainage Remediation Controlling or treating polluted drainage from abandoned mines.

Meander Belt Protecting and preserving land in the vicinity of a river channel in order to allow the river to meander. Meander belts are a way to allow the development of natural habitat around a river.

Non-native Species Also called introduced species or exotic species; refers to plants and animals that originate elsewhere and are brought into a new area, where they may dominate the local species or in some way negatively impact the environment for native species.

Program Element The program elements for the Phase II Alternatives include an element for Delta conveyance, a element for storage, and the six common program elements (Water Use Efficiency, Water Quality, Levee System Integrity, Ecosystem Restoration, Water Transfers, and Watershed Management).

Old River A natural channel in the southern Delta. The channel merges with many other channels in the south Delta, passes by the south Delta export facilities and connects with the San Joaquin River at its upstream end. Much of the water approaching the export facilities flows up Old River from the central Delta. Potential improvements to the channel include a fish barrier at its upstream end to keep migrating fish in the San Joaquin River and dredging north of Clifton Court Forebay to allow more efficient flow to the export facilities.

Overdraft The condition, over the long-term, when more water is withdrawn from a groundwater basin than is recharged.

QWEST A broad indication of the net direction and quantity of flow in the San Joaquin River at Jersey Point. This is only an indicator since net flow is not measurable at this location. Considerable tidal exchange at this point is not included, because QWEST is an estimate of net flow conditions. A positive QWEST indicates the net flow is generally in the downstream direction towards the San Francisco Bay. A negative number indicates that the net flow is generally in the upstream direction to the east. Generally, a positive QWEST is desirable for Delta flow circulation, water quality, and fisheries.

Real-Time Monitoring and Operations Continuous observation in multiple locations of biological conditions on site in order to improve management to protect fish species and allow optimal operation of the water supply system. This is an essential feature to allow flexible operations of the export pumps.

Riparian The land adjacent to a natural water course such as a river or stream. Often supports vegetation that provides important wildlife habitat, and important fish habitat values when growing large enough to overhang the bank.

Riverine Habitat within or alongside a river or channel.

San Joaquin Valley Drainage Program The Federal-State San Joaquin Valley Drainage Program (SJVDP) studied ways of remedying subsurface agricultural drainage and related problems operated during the period 1985-1990. The SJVDP prepared the report titled "A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside of the San Joaquin Valley, September 1990." The report identified the need for 75,000 acres of land retirement by year 2040 but pointed out that without adequate drainage management, soil salinization will occur and potentially cause almost 500,000 acres of land to be abandoned by year 2040.

Setback Levee A constructed embankment to prevent flooding that is positioned some distance from the edge of the river or channel. Setback levees allow wildlife habitat to develop between the levee and the river or stream.

Shallow Water Water with just enough depth to allow for sunlight penetration, plant growth, and the development of small organisms that function as fish food. Serve as spawning areas for delta smelt.

Smolt A young salmon that has assumed the silvery color of the adult and is ready to migrate to the sea.

Solution Principles Fundamental principles that guide the development and evaluation of Program alternatives. They provide an overall measure of acceptability of the alternatives.

South of Delta Storage Water storage supplied with water exported south from the Delta.

State Water Project (SWP) A California state water storage and conveyance system that pumps water from the Delta for agricultural, urban domestic, and industrial purposes. The SWP was authorized by legislation in 1951.

TAF Thousand acre feet, as in 125 TAF equals 125,000 AF.

Tracy Pumping Plant The CVP export pumping plant in the south Delta.

Terrestrial Species Types of species of animals and plants that live on or grow from the land.

Through-Delta Conveyance A means of improving conveyance across the Delta by a variety of modifications to Delta channels.

Upstream Storage Any water storage upstream of the Delta supplied by the Sacramento or San Joaquin Rivers or their tributaries.

Water Conservation Those practices that encourage consumers to reduce the use of water. The extent to which these practices actually create a savings in water depends on the total or basin-wide use of water.

Water Reclamation Practices that treat and reuse water. The waste water is treated to meet health and safety standards depending on its intended use. Also called water recycling.

Water Transfers Voluntary water transactions conducted under state law and in keeping with federal regulations.

Watershed An area that drains to a particular channel or river, usually bounded peripherally by a natural divide of some kind such as a hill, ridge, or mountain.

X2 The location (measured in kilometers upstream from the Golden Gate Bridge) of 2 parts per thousand total dissolved solids. The length of time X2 must be positioned at set locations in the estuary in each month is determined by a formula that considers the previous month's inflow to the Delta and a "Level of Development" factor, denoted by a particular year. X2 is currently used as the primary indicator in managing Delta outflows. The X2 indicator is also used to reflect a variety of biological consequences related to the magnitude of fresh water flowing downstream through the estuary and the upstream flow of salt water in the lower portion of the estuary. The outflow that determines the location of X2 also affects both the downstream transport of some organisms and the upstream movement of others and affects the overall water operations of the CVP and SWP.

Acronyms

A

AB	Assembly Bill
AFRP	Anadromous Fish Restoration Program
ASIP	Action-specific implementation plan
AWMC	Agricultural Water Management Council
AWWARF	American Water Works Association Research Foundation

B

Bay-Delta	San Francisco Bay/Sacramento-San Joaquin Delta estuary
BCDC	San Francisco Bay Conservation and Development Commission
BDAC	Bay-Delta Advisory Council
BMPs	best management practices
BOD	biochemical oxygen demand

C

CCFB	Clifton Court Forebay
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cfs	cubic feet per second
CMARP	Comprehensive Monitoring Assessment and Research Program
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project

CVPIA	Central Valley Project Improvement Act
CWA	Clean Water Act
CZMA	Coastal Zone Management Act

D

DDT	dichlorodiphenyltrichloroethane
DEFT	Diversion Effects on Fisheries Team
DFG	California Department of Fish and Game
DHS	California Department of Health Services
DO	dissolved oxygen
DWR	California Department of Water Resources
DWRSIM	DWR system operational model

E

EEWMA	Economic Evaluation of Water Management Alternatives
E/I Ratio	Export/Inflow Ratio
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
EPA	U.S. Environmental Protection Agency
ERP	Ecosystem Restoration Program
ESA	Endangered Species Act
EWA	Environmental Water Account
EWMP	efficient water management practices

F

FERC	Federal Energy Regulatory Commission
FWCA	Fish and Wildlife Coordination Act

G

GLC	Grant Line Canal
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I

ICP	Interagency Coordinated Program
IEP	Interagency Ecological Program
ISDP	Interim South Delta Program
ISI	Integrated Storage Investigation

J

JPOD	joint point of diversion
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M

"m" species	"maintains"
M&I	municipal and industrial

MAF	million acre-feet
mg/L	milligrams per liter
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MSCS	Multi-species Conservation Strategy
MTBE	methyl tert-butyl ether
μg/L	micrograms per liter

N

NCCP	Natural Community Conservation Plan
NCCPA	Natural Community Conservation Planning Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service

O

Ops Group	California-Federal Operations Group
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P

PCB	polychlorinated biphenyl
PL	Public Law
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
Program	CALFED Bay-Delta Program

R

"R" species	"recovery"
"r" species	"contributes to recovery"
Reclamation	U.S. Bureau of Reclamation
ROD	Record of Decision

S

SB	Senate Bill
SFEI	San Francisco Estuary Institute
SWP	State Water Project
SWRCB	State Water Resources Control Board

T

TAF	thousand acre-feet
TDS	total dissolved solids
TMDL	total maximum daily load
TOC	total organic carbon

U

USBR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service

V

VAMP	Vernalis Adaptive Management Plan
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W

WMS	Water Management Strategy
WUE	Water Use Efficiency Program

X

X2	Location (measured in kilometers upstream from the Golden Gate Bridge) of 2 parts per thousand total dissolved solids
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Y

yr	year
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